

TAPPEH HESĀR

Reports of the Restudy Project, 1976

edited by

Robert H. Dyson, Jr. and Susan M. Howard



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and Susan M. Howard, eds.

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Participants:

Leslie Bennett, University of Pennsylvania
Raffaele Biscione, Museo Nazionale Arte Orientale, Roma
M. James Blackman, Smithsonian Institution
G.M. Bulgarelli, Museo Preistorico-Etnografico «Luigi Pigorini», Roma
Robert H. Dyson, Jr., The University Museum, University of Pennsylvania
Heydeh Eqbal, Iran Center for Archaeological Research
Richard Ellis, Bryn Mawr College
Mary Virginia Harris, The University Museum, University of Pennsylvania
Lee Horne, University of Pennsylvania
Susan M. Howard, University of Pennsylvania
Mirabedin Kaboli, Iranian Center for Archaeological Research
Barbara Lawn, Radiocarbon Laboratory, University of Pennsylvania
Oskar G. Meder, Institut für Geographie, Universität Marburg
George Nowell, University of Pennsylvania
Vincent C. Pigott, MASCA, University of Pennsylvania
Elizabeth K. Ralph, Radiocarbon Laboratory, University of Pennsylvania
Ted A. Rathbun, University of South Carolina
Williams C. S. Remsen, University of Pennsylvania
Ingrid Reindell, Roma
Hassan Talai, Iranian Center for Archaeological Research
Maurizio Tosi, Istituto Universitario Orientale, Roma
Kathryn Maurer Trinkaus, University of Pennsylvania

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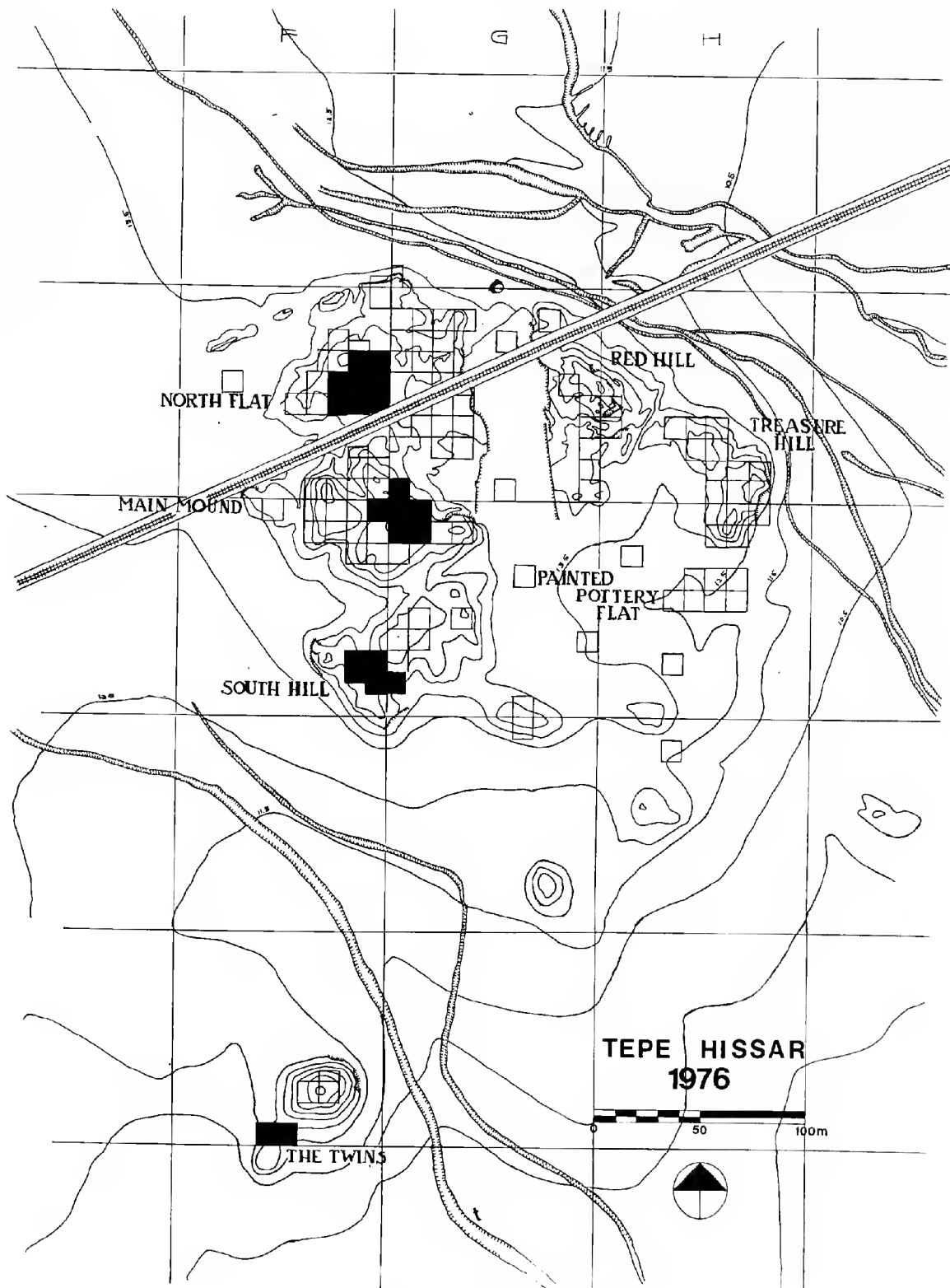


Fig. 2: Site Plan and 1976 Areas of Investigation.

I. INTRODUCTION

Robert H. Dyson, Jr. and Maurizio Tosi

The original excavation of Tappeh Hesār, Dāmghān, Iran was undertaken for The University Museum of the University of Pennsylvania in 1931 and 1932 by Dr. Erich F. Schmidt (1933-1937). At the time the excavation paralleled the early work at Tepe Sialk near Kashan on the western edge of the central plateau by Roman Ghirshman (1938) (fig. 1). From the mid-1930's to the present day two sites, Sialk and Hesār, have provided the major sequences for the northern plateau. The sequence at Hesār covers a range of time from fifth millennium to the second millennium B.C. and is comprised of two major ceramic phases: a stratigraphically earlier one, characterized by painted pottery, and a later one, characterized by burnished black and grey pottery. The majority of the reported artifacts and pottery vessels came from the many graves uncovered at the site, rather than from occupational levels. The published subdivisions of this mortuary material were based largely on assumed stylistic groupings inferred from the grave groups. The relationship of these subdivisions to the occupational levels went essentially undocumented. Occupation levels did, however, contain large quantities of potsherds which, unfortunately, were mostly left at the site unrecorded due to the mass of grave goods which had to be processed by a small technical staff. A cursory examination of sherds left at the site shows that they represent a very high percentage of forms not found in the graves.

In 1956 a brief examination of the site was carried out by Dyson in search of the plain wares which should have occurred with the painted pottery but which were unrecorded in the publication. Other visits took place with Williams Sumner in 1971 and with Susan Howard, Maurizio Tosi, and Firouz Bagherzadeh in 1974. These visits suggested that much new information on stratigraphy, architecture, technology, and ecology could be recovered with a minimum amount of excavation. Indeed, in 1972, inspired by the success of her flint technology studies at Šahr-e Suxteh in Sistan, Grazia M. Bulgarelli made a limited survey of surface materials (Bulgarelli 1974) while in 1976 Jean Deshayes attempted a restudy of surface sherd material (Deshayes 1975). Both of these efforts, however, lacked a stratigraphic context and a chronological placement without which their significance could not be adequately tested. The same deficiencies have attended all other efforts to deal with material from the site (Dyson 1965:238-242).

Thus, in 1976, a joint Hesār Restudy Project was organized by The University Museum, Turin University, and the Iranian Center for Archaeological Research (fig. 2) Architectural and stratigraphic studies were

carried out on the North Flat by Robert H. Dyson, Jr. and W.S.C. Remsen; on the Main Mound by Susan Howard and Vincent Pigott, and on the South Hill by Maurizio Tosi, Grazia M. Bulgarelli, and Ingrid Reindell. Raffaele Biscione made a stratigraphic study of the westernmost mound of the Twins, two small mounds lying just to the southwest of the Main Mound area. Hassan Talai and Haydeh Egbal carried out excavations on the North Flat and assisted in work on the Main Mound and South Hill. Mirabedin Kabuli also joined the excavation for ten days and assisted with work on the Main Mound and South Hill. The whole staff working together carried out a surface survey of the site concentrating on copper slag, pottery wasters, and lithic debris from the working of flint, calcite, lapis lazuli, and steatite/chlorite. A more detailed survey was then done on metallurgical remains under the direction of Vincent Pigott and a special study of flint and lapis lazuli materials was conducted by Grazia M. Bulgarelli. Maurizio Tosi directed the recovery of botanical and zoological remains by means of flotation for all areas. To place the site in its environmental setting a geomorphological survey of the plain was completed by Oskar Meder of the Marburg Geographical Institute. This work was paralleled by a site settlement survey for all periods completed by Kathryn Maurer Trinkhaus during November and December.

The study program had a variety of aims among which were (1) the collection of data relevant to the reconstruction of the geomorphological and ecological setting of the site as related especially to aspects of economic exploitation of that setting during the Bronze Age and the Neolithic; (2) the study of the changing settlement pattern of the plain through time; (3) the accumulation of evidence relating to the use and organization of various areas of the site and the description of manufacturing techniques relating to specialized activities; (4) the collection of stratified carbon samples for the construction of an absolute chronology for the site and for their use in a relative chronology of various parts of the site in an effort to understand the dynamics of settlement formation over the years; (5) the more accurate description of architectural forms and masonry techniques, their dating both relative and absolute, and an assessment of their importance in relation to cultural change at the site; (6) the collection of stratified samples of artifacts and pottery for comparison with the grave groups and an assessment of the contents of stratified occupation levels in relation to the described stylistic periodization of the grave groups. An underlying question of great interest

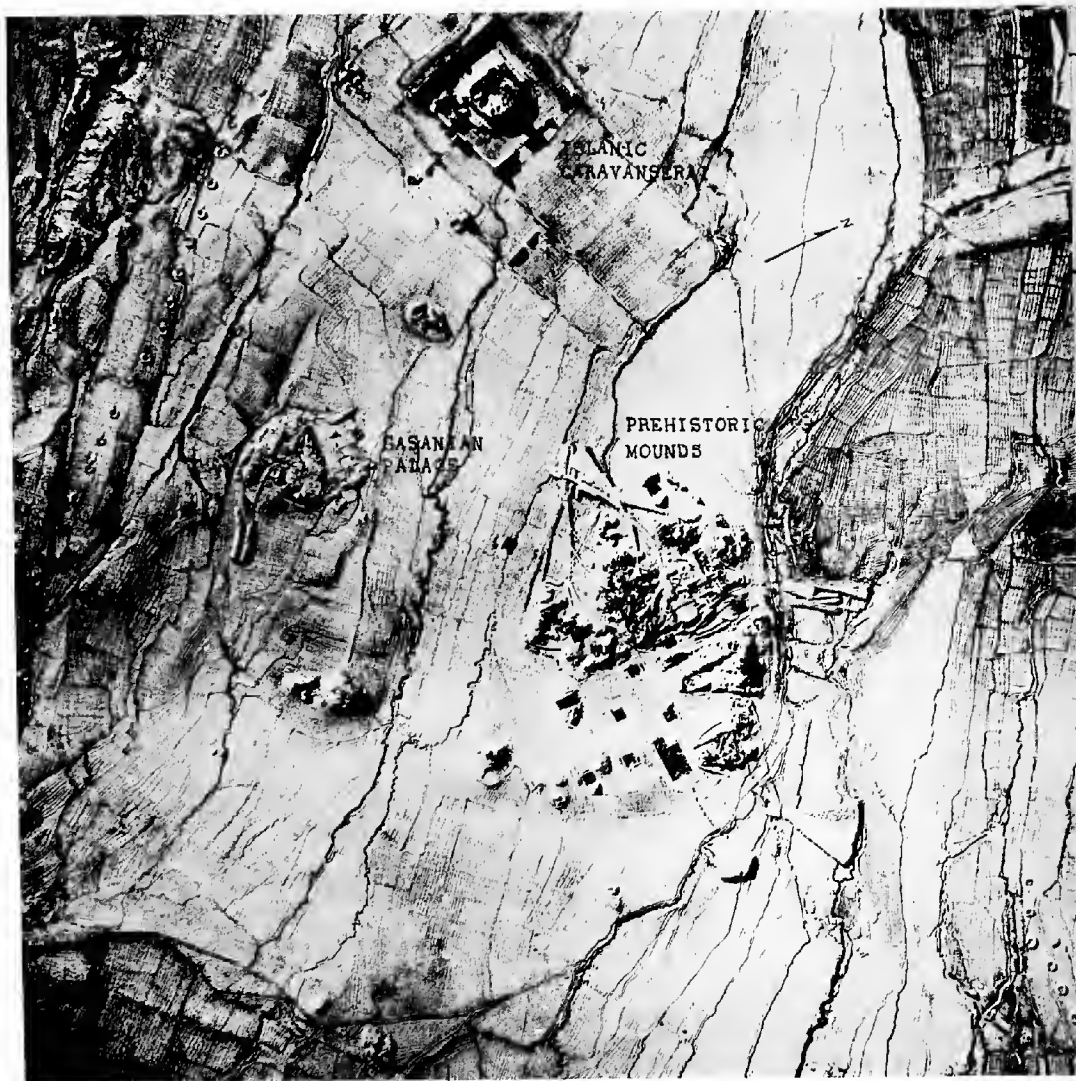


Fig. 3. Air View of Schmidt Investigation (1935).

Natural resources are distributed around the basin. Equidistant from Tappeh Hesār are the high valleys to the north, rich in flint, lead, wood, fruit, deer, stag, boar, fish and fowl and the arid periphery of the kavir to the south with its known occurrences of copper, gold, turquoise and semi-arid fauna with herds of gazelles and onagers (fig. 4).

The site lies close to both these areas at an optimal altitude for exploiting the farming potential of the valley in terms of surface waters and available soil. This location is similar to that of other major piedmont towns of the fourth and third millennia B.C., such as Namazga depe, Altyn depe, and Shahdad. The wealth of these settlements was primarily built on farming and

cattle/sheep herding, with the terminal branches of the piedmont deltas affording the broadest possible irrigation with a minimum number of canals necessary to spread the water. In the case of Tappeh Hesār the situation seems to have been ideal. The most suitable location for subsistence production was also the central one for almost all the biological and mineral resources necessary both for a wide and varied diet as well as for the manufacture of prestige articles. Most of the metals and stone used occur within a radius of 50 Km. from the site – a two or three day journey on foot for a man with a backpack. – Tappeh Hesār was thus ideally located to become a regional resource-coordinating center.

In the vast region between the Kara Kum and the



Fig. 4: Ertis-Satellite View of the Dāmghān Area.

Indian Ocean during the third millennium B.C., the major settlements of each territorial unit grew in size and at the same time became internally more complex – a change which appears in most instances to have been accompanied by the functional segregation of different activities. The settlement at Hesār appears to have paralleled this cultural and economic evolution in every aspect except size. When we consider the few environmental constraints existing in a well-flooded and temperate area such as the Dāmghān basin with its variety of ecosystems available at a short distance from the settlement, this anomaly of size would seem to contradict logical assumptions used elsewhere as a basis for interpretation. The most likely hypothesis to explain this anomaly is that Tappeh Hesār in its later periods has been subjected to a very high degree of erosion and other forms of earth removal different from those

affecting other proto-historic sites in eastern Iran. Indeed, human activity has been constant in the Dāmghān area with over 4000 years of essentially continuous farming all around the site. The rich soft earth from the site was certainly gathered to increase the productivity of the neighboring alluvial soils. In Dāmghān we did not have the dramatic deltaic changes or the sharp decreases in population density that have allowed the optimal state of preservation seen at Šahr-e Sūخته, Namazga depe, or Altyn depe. Both Sistān and southern Turkmenia have suffered prolonged periods of economic marginalization from time to time, whereas the Dāmghān region exhibits a remarkable continuity of settlement and wealth.

It is no wonder then that the earliest mention we have found in the literature about Tappeh Hesār refers to an intense activity of soil extraction and treasure

hunting. The reference is contained in the notebook of Gen. A. Houtum Schindler (1887) an Austrian who served in the Persian army under Nasseruddin Shah, republished in Farsi by the University of Tehran in 1968 (1347 A.H.). Houtum Schindler records that in 1870 all the inhabitants of the villages around the mound were intent on digging in the search for gold and soil.

The whole western side of the major mound area (fig. 2, 3) is in fact denticulated by V-shaped gulches, with little correspondence to run-off gullies. Between these gulches stand vertical faces showing exposed strata left from the cutting away of their western extension (such faces are easily seen on the contoured map of the site published by Schmidt where the contour lines cluster closely together). Also the wide trench which now separates the Main Mound from Red Hill, already excavated before 1930 (as it appears on Schmidt's original map), with its straight and steep sides is clearly the result of human pillage assisted by episodes of exceptional flooding. Red Hill (like the North Flat before the railroad cutting was made) probably originally formed a continuous part of the Main Mound. The aerial photograph of Tappeh Hesār in the archives of the Oriental Institute of Chicago, taken by Schmidt on September 23, 1935 from an altitude of 1525 m. (fig. 3) shows the site surrounded by deeply ploughed fields, located in the middle of a run-off network with evidence of marginal cultivations on the *wadi* bed (1940: Pl. 44). In the forty years which passed between that photography and our fieldwork, the introduction of mechanical ploughing and canal digging, not to mention the Trans-Iranian railway construction cutting directly through the mound, have continued the slow destruction of the site.

Schmidt was aware of this poor preservation and he considered it a result of aeolian and alluvial erosion (1933: 331). This kind of erosion is, of course, operative on all of the ancient sites of eastern Iran. There is no site more deflated by wind erosion than Šahr-e Sūxteh, where at the same time the state of preservation is magnificent. As in the case of every other natural phenomenon, aeolian deflation immediately produces an anomalous concentration of the heavier materials, such as gravel in alluvial deposits, or sherds in archaeological deposits, that soon develop

into a protective crust: the tougher the wind action the sooner the surface is protected (cf. Goudie, Wilkinson, 1977: 14-15, fig. 9).

If in addition to the aforementioned evidence, we take into consideration the fact that the Sassanian building in sq. FD was built making extensive use of the clay, soil and cultural materials from the ruined site, as well as the proximity of a large *Qal'eh*, the so-called caravanserai, off the northwest edge of the site where life must have been rather active until the turn of the century with its additional needs for building material, we see further sources for destruction of the site.

Thus the size of Tappeh Hesār during the third millennium can no longer be reconstructed on the basis of present evidence; it is impossible, therefore, to quantify the settlement size for purposes of comparison with the contemporary settlements in eastern Iran. This is especially true for the final periods of occupation which are now represented by very limited deposits. It may be that a systematic study using drilling techniques or some other sampling strategy will some day be able to specify the area of the early settlement, protected as it is by sediment and later occupational deposits. For the time being, however we cannot be sure of the real magnitude of areas of settlement at any given period, nor of the full size of any activity areas within the settlement. At best we have a sample of unknown size relative to the original universe.

Of that sample the following studies represent a further sample. The various materials are undergoing detailed study at appropriate laboratories and institutions under the direction of appropriate specialists. This work is still in a preliminary stage but some interesting results are emerging. The outlines of these results and some of their implications for the reconstruction of the prehistory of this site and region are set forth below. All those now participating in this project demonstrating the importance of cooperative research and reconsideration of older materials in the light of new methods and changed intellectual perspectives thank the sponsoring organization for the opportunity to do so. Special thanks is due to Susan Howard for undertaking the major editorial duties relating to the presentation of this report.

II. THE GEOMORPHOLOGICAL AND ECOLOGICAL SETTING OF TAPPEH HESĀR IN THE DĀMGHĀN PLAIN, 1976

Oskar G. Meder

Dāmghān and Tappeh Hesār, about 2 km. to the south, lie at the foot of an alluvial fan which pours out of the Alborz into the *kavir-e Dāmghān*. The position of the prehistoric mound of Hesār is outlined below within this morphological system. From the underlying geo-ecological conditions of the settlement site and its cultural stratigraphy, as well as from sedimentological analyses of a *qanat* section, indications of the local Holocene environmental history can be recovered. This information will be compared on a supra-regional basis with alluvial-historical data from the central and northeast plateau as well as with conclusions from archaeological excavations of early habitation areas.

Geological Overview and Stratigraphic Indications

Tehalenko (1974) classifies the *kavir-e Dāmghān* seismotectonically with the Torud Province, as a depression in contrast to the surrounding mountains which border it. Seen as a whole, however, the seismotectonic province is upheaved against the orographic system of the Alborz. From this a tectonic echelon system results running parallel to the Alborz chains. This system is characterized by several tectonic fault lines (Torud-, Larestan- and Dāmghān Fault; see Berberian 1976), which are still extremely active (pl. 1a).

The most recent earthquakes were reported from the Torud region at the southern edge of the *kavir-e Dāmghān* in 1945 and 1953, with a 1.40 meter shift of alluvial sediments during the latter (Berberian 1976:75). Ambraseys (1968, 1974) reports from historical sources on the catastrophic quakes of A.D. 856 and 1830 which almost completely destroyed Dāmghān and opened meter-wide gaps in the ground. These tectonic movements occurred mainly along the Dāmghān Fault which runs along the southern edge of the Alborz.

Krinsley (1970:781) traced three erosion levels south of the Dāmghān Fault totaling 10 m. in height (the height of each level fluctuates relative to the others) which he considers to be results of tectonic movements. The substratum of the levels is interpreted granulometrically by Krinsley as *kavir* sediment (i.e., still-water sediment), by which he compares these sediments with the recent *kavir* sediments. By comparing the levels in question to the granular spectrum of recent *kavir* sediments which they resemble, Krinsley concluded that the *kavir* originally extended into that area, but that since the Quaternary the *kavir* has sunk approximately 106 m. in relation to the Alborz,

including subsequent rates of sedimentation. This total is probably high since Krinsley compares *kavir* border sediments with sediments from the basin interior and does not deduct for the natural gradient. If we estimate the recent gradient of the Dāmghān Rud alluvial fan from the highest level, 1.138 m. above sea level, to the lowest point to the *kavir*, 1.068 m. above sea level, a difference of 70 m. in height results. Deducting this sum from Krinsley's 106 meters, an adjusted total of probably somewhat more than 36 m. results for the Quaternary. These considerations point out how carefully stratigraphic terrace findings along the Dāmghān Rud must be interpreted if they are to be used as climogenetic evidence, especially as the Rud-e Astaneh and the Dāmghān Rud, after their convergence, drain along tectonic lines of disturbance (Cešmeh Ali Fault).

The open lithofacies of the southern Alborz chains begin with not very thick alternating Infra-Cambrian sandstones and dolomitic limestones as the oldest strata. All successive newer strata are bevelled off with basalt, tuffa, quartzites, red sandstone, black dolomite, calcareous marl and gypsum marl, as well as tertiary conglomerates and travertine in which Jurassic basalts and limestones dominate (Alavi and Salehi 1975). The alluvium of the *kavir-e Dāmghān* is made from these petrographic components and test borings for the Quaternary estimate it to be more than 150 m. thick a bit south of Dāmghān (Ministry of Water and Power, Dāmghān Report 1967).

Climate and Hydrology

Northwest winds dominate all through the year at the southern edge of the Alborz, blowing with increased strength in summer because of the local low pressure center in the *kavir-e Dāmghān*.

It is these same northwest winds which bring the little precipitation of the area, especially in the winter and spring months (fig. 1). In the mountainous region of the Alborz about 400 mm. of precipitation falls, mostly as snow in the winter. In contrast, only 92 mm. average annual precipitation is measured in Dāmghān. There may be only sporadic precipitation in the center of the *kavir*. Overall, the average mean precipitation fluctuates dramatically.

The mean annual temperature is 14.4° C, the lowest -17° C. Frost can be counted on from November until the beginning of April. During the seven dry months, the potential evaporation exceeds by far the annual precipitation rates.

The moisture pattern of the *kavir-e Dāmghān*

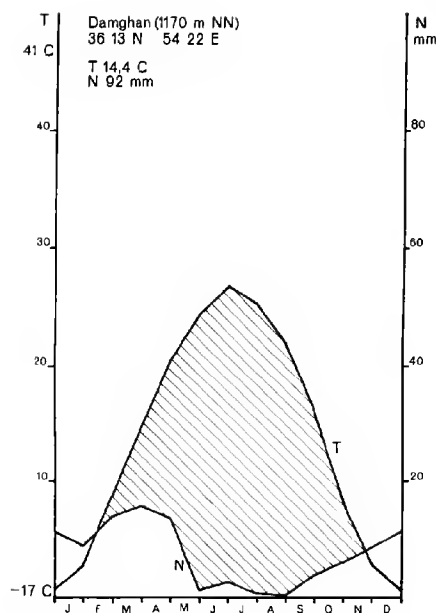


Fig. 1: Klimadiagramm Damghan (1957-73)
(nach Methode WALTER)

depends primarily on tributaries from the Alborz. In the northern and central regions, the Dāmghān Rud empties into the *kavir*. It has water all year round (surface run-off of about 2.2 million m³/a) and drains an area of nearly 1,200 km². Until the peak run off during the spring thaw, the Dāmghān Rud is fed mainly from Jurassic karst intermittent springs, the largest of which is the Česme Ali with 450-500 l/s intermittently. The Namakab Rud, which drains Jurassic as well as Triassic limestones but primarily Neogene conglomerates along the Česme Ali Fault, is as the name implies (Namakab = saltwater), more saliferous than the intermittent springs. In the salt marsh of the *kavir* the brine solutions which are brought in are concentrated by the high rate of evaporation in summer and finally crystallized out, so that in late autumn the central basin of the *kavir* is covered by white salt efflorescence. However, in the late autumn of 1976, after a year of heavy precipitation, the entire salt lake was still covered with water.

The ground water discharge into the *kavir* amounts to about 6 million m³/a. Of this, about 3.5 million m³/a is drained off by about 190 *qanats* which supply ca. 80 villages. The parent wells of the *qanats* are sunk to between 12 and 110 m. Many *qanats* have been left unfinished since 1967 however, partially as a result of the ground water subsidence which resulted from the demand for water from deep wells (4.5 million m³/a).

The depth below plain level of the ground water amounts to more than 100 m. north of Dāmghān; in Dāmghān itself the ground water level stands at 48-50

m. below the plain. The depth below plain level of the ground water, however, is not uniform, since divers aquifers are filled by tectonic displacement; in part piezometric ground water is present.

Generally, the ground water table on the edge of the *kavir* rises up to about 2-3 m. below the surface. From time to time the ground water in artesian wells at the edge of the *kavir*, in which frogs live, rises to the surface (run-off ca. 5 l/s).

The ionic composition of the ground water fluctuates between 28.4 and 48 mg/l and has accordingly a slight oligohaline character in which the content of hydromg carbonate is dominant over sulfate and chloride

Concerning Geomorphology in the Dāmghān Area

The drainage area of the Dāmghān Rud to the convergence of the Rud-e Astaneh and the Namakab Rud can be roughly outlined as the Upper Dāmghān Valley. After this the Dāmghān Rud pierces a canyon, like horst of Devonian sandstone and limestone, cutting about 40 m. into the plain. Above Dāmghān, at the gradient curve of the plain, the river begins to bifurcate and to anastomose. It thereby fills up the Dāmghān alluvial fan, which slopes away into the *kavir* with a gradient beginning at 8-10%, finally emptying into a salt lake (pl. 1a).

In the Namakab Rud Valley in the mining region above spring level (about 1500 m. above sea level) the substratum was formed in recent times presumably by frost shattering during the transitional seasons during the alternation of day and night temperatures. As a result of the almost complete deforestation of the mining region and the degeneration of alpine meadows, the frost protection line which otherwise could normally be established above 2000 m. is sharply lowered. Moreover, the expansive power of salt as a processing mechanism also comes into play: a fact already alluded to by the name Namakab (saltwater). The debris, however, is hardly transported at all. This lack of transport can be seen in the valley of the Namakab Rud, where two terraces, an upper and a lower terrace, at times 3 and 2 m. high were formed. The lower terrace might correspond to the flood terrace. A Sassanian mound is currently being cut through. In the river bed itself sediment transferral is occurring and rubble with a diameter of up to 30 cm. is being moved.

Shortly before the union of the Namakab Rud with the spring water from Česme Ali, the Namakab Rud cuts through Carboniferous-Devonian limestones. On the convex banks an upper and lower terrace were again formed. Kettle holes have been eroded into the convex banks, which correspond in their relation to the upper and lower terraces. The occurrence of 15-20 m. high kettle holes causes one to infer a previously greater water volume. Recently the Namakab Rud has flowed in the canyon-like cut on a 30-50 m. high wall of debris, which is moved over the outcropping.

The spring waters of Česme Ali begin to cut in about 2 km. below the point of exit. About 24-36 hours after the last occurrence of precipitation, the

spring flows most strongly. Here clayish and silty sediments are being laterally cut. The kinetic energy does not suffice for incision, since coarser substrata can scarcely be moved.

Below the village of Astaneh the Česme Ali spring water flows into the Namakab Rud. In this area of confluence, remains of the upper and lower terraces with a height of about 15 m. were surveyed. On the upper terrace agriculture is practiced. The river downcuts further downstream, until finally at Axnameh a third terrace is added. The Dāmghān Rud is here incised a total of 25 m. What previously was the lower terrace thus becomes the middle terrace. The slope of the Dāmghān Rud in this segment is not continuous. Stretches of rapidly flowing water alternate with stretches of less rapid flow. The height of the individual terraces varies accordingly.

On both sides of the Dāmghān Rud along this segment of the upper terrace Sassanian and Islamic settlements are located. Today only their sherds remain (see Part XV). The upper terrace itself is very deeply transected, often from 5-8 m., the cut keyed to the main drainage channel. Below the bridge over the Dāmghān Rud on the Dāmghān Česme Ali road and shortly before the river breaks through the Devontan deposits, the Dāmghān Rud has cut into red and green marl. The middle terrace in this area has probably been cleared away. The exposed sediments are considerably cemented by travertine.

In a canyon-like break the river bed is narrowed to a width of about 30 m. Cemented remains of the upper terrace crop out to heights of 8 m. as concave banks in alcoves.

After the river has cut through the Devonian outcropping, it enters the Dāmghān area. The river cuts into the plain a total of about 35 m. The banks fall away vertically. After about 3 km., with a 5% slope, the valley loses its canyon-like character and widens out. Here again three terraces were successively formed. These taper off about 2 km. above Dāmghān where the river begins to spread out on the alluvial fan.

The main erosion channel of the Dāmghān Rud is cut about 2-3 m. deep but levels out more and more in the direction of the *kavir*. In doing so, it cuts across clayish-silty sediments which are strongly incrustated at the base. Since the greatest portion of the run-off water is diverted above Dāmghān, the bed carries water in which gravel and rubble are moved only during peak flow.

The terrace system comes to an end toward Dāmghān, while the recent flood terrace subsides east of Dāmghān (pl. II). The entire alluvial fan drops away to the east in hourglass shape at about a 1% grade. Obviously the area of debris has shifted in that direction, since the old drainage channels of the river which bifurcate at its bend can be proven to be gravel-filled channels. The displacement of the debris of the Dāmghān alluvial fan toward the east probably took place in Sassanian times, since the prehistoric settlement of Hesār, about 2 Km. below Dāmghān, lies on what was formerly the main drainage channel. On the other hand a Sassanian site was established northeast of Dāmghān alongside the main drainage channel. This

Sassanian site is presently cut up by gully erosion to a depth of 3 m.

On the plain itself two sediment levels are impressed (Krinsley 1970, Weise 1974). They can be followed to beyond Šahrud, but they cannot be brought into direct connection with the terraces. Uppermost lies a baked gravel deposit 1 m. thick, followed by a thick clayish-silty bank about 2 m. in thickness, which Krinsley calls *kavir* sediment. On the lower level lies an unsorted substratum about 3 m. thick, with a clay-gravel spectrum. The underlying stratum here also consists of clayish-silty sediments. On the plain the substratum is moved only during the episodic heavy rains. Below Dāmghān there are erosion channels in the clayish-silty sediments up to a depth of 3 m.

The *kavir-e Dāmghān* itself was carefully classified by Krinsley (1970). He distinguished a peripheral layer of clay followed by a moist zone finally changing into a salt efflorescence area. The moist zone fluctuates according to the annual influx of precipitation.

Summary

The recent morphological dynamics of the Dāmghān area are already, because of the anthropogenically determined absence of vegetation, characterized in the mining as well as in the alpine levels by debris production through frost and heat shattering, and by salt shattering in the catchment area of the Namakab Rud. It is evident that this debris is scarcely carried away. In the catchment area of the Rud-e Astaneh, the Namakab Rud, and also the Rud-e Dāmghān, the substratum is moved only at times of peak flow, i.e., during thaws in the spring or after heavy rains. At such times inactive sediment banks are dissolved and there is slight lateral erosion as well. Overall, however, incision predominates. Recent trenching is further documented by the dissolution of terrace levels by means of gully erosion. The trenching of the levels is datable through remains of historical building materials (Sassanian, Islamic) or through pottery sherds.

On the Namakab Rud two terraces were formed and along the Dāmghān Rud three terraces. Although regularly fluctuating drainage rates can be assumed for the Quaternary in the Dāmghān area, the coordination of the terraces climo-stratigraphically has not yet been successful because of the complicated nature of the tectonics in this area. The area has been active in recent times such that it is questionable whether it will be possible to make climate-historical pronouncements based on terrace-stratigraphic methods in this area.

Krinsley (1970) has coordinated the different sediment levels of the Dāmghān plain which extend to Šahrud, with tectonic events along the Dāmghān Fault. The fine sediments indicate a significantly larger area of expansion of the *kavir* in earlier times. They support the hypothesis of fluctuating Quaternary drainage rates from the Alborz. Nevertheless, tectonic phases of activity along the Dāmghān and Česme Ali Faults cannot at present be determined temporally.

Analysis of a Qanat Profile below the Prehistoric Mound of Hesār

The opportunity to present one possible connection between morphological development and settlement history of the Dāmghān area is directly offered in the region of the prehistoric mound of Hesār.

About 200 m. down slope from Tappeh Hesār are clayish-silty qanat protrusions in a gray-green band about 40 m. wide. These gray-green, clayish-silty sediments were interpreted on the basis of the exits of the qanats which run parallel to one another to form a sort of beach line or fill zone (pl. II). Similarly colored sediments were found about 6 km. further south in a region of what are called «artesian wells», thus strengthening the assumption that the qanat exits could represent the former fill zone of a kavir lake. This raised the possibility of absolute dating by the C 14 method. In 1933 Schmidt estimated that the earliest occupation at Tappeh Hesār could extend into the fifth millennium (Schmidt 1937:321). This estimate appears reasonable for the very earliest settlement in view of the radiocarbon determinations obtained from samples collected during the 1976 season (See Part XVI).

It was necessary to explore the recent fluvial restrictions in order to classify the succession of deposits of the qanat profile according to the terms of their assortment and sedimentation conditions. For this purpose a relief sequence of the granularity distribution was set up, correlating the results of sediment samples taken from the plain at the canyon-like break, through of the Dāmghān Rud at the foot of the Dāmghān alluvial fan and those from the kavir at the previously mentioned artesian wells (for sampling locations see pl. II; the results of the laboratory analyses are presented in Table 1). That is, comparison of the results of the granulometric analysis of the vertical qanat profile with those of the relief sequence of the granularity distribution allows (with an assumed long-range constant regularity of the processing mechanics of the substratum) inferences about the previous transport and sedimentation conditions of the substratum which predominates in the area of the qanat.

Table 1: *Relief sequences of the granularity distribution plain to kavir*

(data in %)

Sampling locations:	Dāmghān Rud Branch	Foot of the Dāmghān Alluvial Fan	kavir Artesian Wells
Clay	6.5	14.0	19.0
Fine Silt	8.0	20.0	28.0
Medium Silt	29.0	33.0	14.0
Coarse Silt	29.5	33.0	37.0
Fine Sand	17.5	0.0	2.0
Medium Sand	3.0	0.0	0.0
Coarse Sand	6.5	0.0	0.0

The genetic connection, in the sense of a sorting mechanism, of the surface substratum running from the plain at the edge of the mountain range into the kavir, is clearly recognizable from the chart. While clay and fine silt contents increase, the amount of

coarser particles decrease as one moves toward the kavir. The results of the analysis of the qanat profile are presented in (pl. Ib). The granularity analysis shows that the granularity spectrum ranges almost exclusively in the area of clay to coarse silt and is subject to strong fluctuation which it would be worthwhile to interpret. Unequivocally, too, the ion content of the sediment correlates with the varying granularity spectrum, as the quotient from the ion concentration and clay content shows (= clay correlation). Since the regularity of the movement of ions in clayish sediments under corresponding conditions is currently insufficiently known, as are also the depositional conditions of sediments with high clay content, caution is advised in the interpretation of the analysis results of the qanat profile. The author is completely aware of the partially speculative character of the following discussion.

In the qanat shaft at a depth of 2 m. a small piece of charcoal about 1 cm. in diameter was encountered. At this depth there was also a high copper content (0.07%). The other sediment tests contained copper only in traces. It is known that the working of copper/bronzes was already known during the earliest occupations on the mound of Hesār (See Part IV). This high copper content, then, together with the piece of charcoal confirm that this level within the qanat represents a prehistoric cultural horizon. It can, therefore, be assumed that Hesār did not lie in the nearest kavir lake fluctuation area at this time.

At a depth of 17.5-18 m. the previously mentioned gray-green sediments containing fossilized plant remains and an Ostracod and Mollusk (identified by Prof. Huckriede, Marburg) were encountered. The remains of the back molars of cattle were also found. The C14 determination of the sedimentation produced an age of $17,860 \pm 370$ B.C. This date was provided by the C14 laboratory of the Landesanstalt für Bodenkunde in Hannover (Hv 8157) under the direction of Professor Huckriede. I would like to take this opportunity to thank him most heartily.

As for the plant remains, presumably represented are *Typha* and *Phragmites*, reed-types which are found on prehistoric Tappeh Hesār as well as in the area of the artesian wells. The Mollusc and Ostracod fauna imply light oligohaline environmental conditions. This interpretation is supported by the analysis of the sediment test from the area of the artesian wells:

Table 2: *Geochemical analysis of artesian well*

pH Value	7.8
Conductivity	1,100 milliohms per meter and square centimeter
Carbonate volumetrically	21%
gravimetrically	18%
Sulfate	5%
Chloride	0.01%
Calcium	5.50%
Magnesium	5.50%
Strontium	0.69%
Potassium	2.40%
Sodium	3.00%
Aluminum	7.30%
Iron	1.56%
Manganese	0.25%

For the granularity spectrum see Table 1; *kavir*, Artesian Wells.

There is a high degree of conformity between the values of the calcium content from the tests from the area of the artesian wells and the *qanat* tests from a depth of 17.5-18 m. (pl. 1b). The bank-shaped dispersal of gray-green sediments charted on the basis of *qanat* deposits, the faunal findings, the agreements of the analysis values with the sweet water sediments in the area of an artesian well on the *kavir* border, as well as the C14 date based on a fossil flora discovery, leads to the hypothesis that around 18,000 B.C. the *kavir* lake of Dāmghān had a substantially larger expanse than it does today and offered a sweet water to lightly-oligohaline fauna with corresponding habitat conditions.

Moreover, it follows from this hypothesis that from 18,000 B.C. to roughly 4,500 B.C. a 16 m. thick sediment was deposited below Tappeh Hesār. From about 4,500 B.C. to today, about 2 m. has been deposited. During this period, interim erosion phases must be assumed, especially since filled-in erosion channels in the older sediment indicate such phases.

For an interpretation of the events from the period after 18,000 B.C. the sedimentological analysis of the 18 m. thick sedimentation remains. These sediments comprise deposits within the spectrum of clay-to-sand, with clay and silt, as previously mentioned, predominating. The clay content fluctuates between 2 and 38% (i.e., the sedimentation conditions move between limnic and sheet flood-fluvial forms). The decomposition of clay minerals *in situ* must be drawn into consideration.

If the 17.5 m. horizon with a clay/fine silt content of 55% is taken as the still-water sedimentation-index horizon (as characterized by the C14 dating and corresponding flora and fauna) it can then be assumed that corresponding horizons with clay/fine silt contents above 50% represent still-water sedimentation horizons. That is, the *kavir* lake would have expanded in the corresponding periods up to the area of the analyzed *qanat* profiles (pl. 1b). This expansion would be seen at 17.3-19 m.; 13.5-14 m.; 8.5-9 m.; 7.5-8 m.; 4.5-5.5 m.; 1-1.5 m. of the profile. Therefore, five longer and shorter expansion phases of the *kavir* lake since 18,000 B.C. can be determined. The conditions at 8 m. and 8.7 would be designated as of relatively short duration. On the other hand, if one assumes no still-water sedimentation conditions for the areas of high clay/fine silt content, the clay mineral decomposition can be brought into play as a secondary process as the cause of the high clay/fine silt content.

For this process the moist conditions which are also necessary have been provided by a high ground water level (i.e., higher ground moisture through rising ground water). This situation might thus also have corresponded to the expansion phases of the *kavir* lake.

Besides the consideration of the granularity spectrum, a further aspect to be analyzed is the behaviour of certain cations and anions in the sediments which clarify the migration behaviour of certain ions in sediments of varying granularities.

Alternating moist-humid conditions can hardly be assumed for the sedimentation process, although the

influence of local precipitation presumably served as a basis for a certain range of variability. It is necessary, therefore to reckon primarily with the influence of rising ground water streams which make possible the movement of the ions. The clayish/silty sediments can thus be treated like a chromatogram, assuming that ions with the greatest ion radius (Sulfate > carbonate > chloride; $K > Sr > Ca > Na > Mn > Fe > Mg > Al$) behave most sluggishly.

In sediments with a small clay content (that is, with poorly-developed capillary attraction) ions do not move away much, but rather are concentrated and incrustated in the transitional realm of clay/silt/sand (note in the amount of Mg, K, Na, Al and Fe in the profile at 4 m., 7 m. and 9 m.). The ion content of the sediments still correlates strongly with the clay content—especially Sr and Mn (pl. 1b, broken lines as clay correlation). Here especially, the high correlation of Ca and Al with the clay content implies secondary weathering processes. These, however, do not agree because these two elements in the profile range between 9 m. and 7 m. where migratory processes can, therefore, be assumed.

The chloride concentration is relatively small in the lower range of the profile. It is only in the upper half of the profile that the amount of chloride increases, caused by the high mobility of the chloride ions. A similar situation exists with the sulphate content, which is relatively high (5%) only at 17.5 - 18 m. where the high sulphate is presumably dependent on organic sulfur-compounding. It does not reach higher concentration again, however, until the upper third of the profile. Chloride and sulfide concentration correlates in part in the lower area of the profile as well as from 0 - 4 m. Between 7 and 4 m. the values are nearly antipodal.

The carbonate content reaches its highest values (35%, at 8 and 8.75 m.) and here correlates closely with the clay content. The carbonate content, of course, must be interpreted with caution since it is a question mainly of limestone and dolomite in the rock in the catchment area (i.e., secondary uncrystallized calcareous concretions can hardly be distinguished analytically from primary sediment). The sulfate content is negligibly small at 8 and 8.75 m. while the chloride concentration is slightly higher.

Arid conditions can tentatively be assumed for the rising chloride and sulfate content from ca. 9 m. upwards. As a result of the closely correlated clay content, both carbonate peaks at 8 m. and 8.75 m. must be recognized as possible still-water sediments; that is, as the last great expansion phase of the *kavir* lake. The rising chloride and sulfate content indicates fluctuating ground-water streams and, with it, fluctuating ground-water levels. The high clay content at 0.5 - 2 m. and 4.5 - 6 m. can thus be considered as representing secondary weathering processes, determined by high ground moisture (i.e., high ground water levels) which would correspond to the beginning of occupation of Tappeh Hesār around 4,500 B.C.

Underlying Ecological Conditions of Prehistoric Tappeh Hesār

The low level of precipitation on the southern flank of the Alborz is reflected by the natural vegetation and soil-forming processes.

Probst (1977) differentiates the natural vegetation of the southern slope of the Alborz into dry shrub formations with *Amygdalus reuteri*, *Berberis integrifolia*, *Crataegus* types, and *Juniperus macropoda*, which merge into the artemesia steppe with *Artemisia herba-alba* and *Tamarix*. This relatively rough differentiation, however, does not prove correct for the intramontain valleys, the alluvial fan or the *kavir* border area. Although the natural vegetation is nearly destroyed (cf. for the upper Dāmghān Valley: Abott, Boden, Whitaker 1970), one can reckon on a previously substantially thicker and species richer endowment. Along the perennial drainages, gallery woods might have been settled, with willows and poplars as dominant species. On the alluvial fan the poplars are separated more and more from the tamarisks, which finally form a fringe about 1000 m. wide at the foot of the alluvial fan. These are then replaced in the direction of the *kavir* by *Haloxylon aphyllum*, *Seidlitzia rosmarinus* and *Haloxylon* species, until it finally becomes the completely barren salt clay soils of the *kavir*. In addition, local artesian springs turn up in these regions, as previously mentioned, around which *Tamarix*, *Phragmites* and *Typha* are established.

If one follows a ground catene from the mountain range down into the *kavir*, one finds in the mountains, as a result of somewhat higher precipitation, zonal soil formations. Here it is a question of chestnut colored soil on a colluvial substratum. The soils have a high carbonate content (ca. 20%), are often very shallow with little humus content and are scarcely stratified (Regosols). On the Dāmghān alluvial fan oasis the soils have a clayish silty matrix, little humus content, a tendency toward oversalting and have carbonate efflorescences in the upper soil. Since the entire alluvial fan into the *kavir* is used agriculturally, the natural tendency toward solonchakization could be strengthened by irrigation farming.

Floral and faunal findings as well as zoomorphic artifacts from Tappeh Hesār confirm the assumption of previously more favorable ecological conditions. In addition to reeds, the reopening of excavations at the mound revealed bones from *Bos* sp., *Capra hircus*, *C. aegagrus*, *Equus* sp., *Onager* Hemys, *Gazella* sp., *Ovis* sp., *Felis* sp., *Canis* sp., *Lutra* sp., and presumably *Camelus* cf. *bactrianus*. In zoomorphological artifacts Schmidt (1937) had found a rich spectrum of animal figurines made of clay and alabaster: goats, sheep, bears, bulls, tigers, lions, pigs, dogs and ducks. Numerous animals were also depicted on the pottery. Findings of *Triticum dicoccum*, *T. aestivum*, *Hordeum*

sp., *Aegilops squarrosa*, *Lens esculenta*, as well as *Vitis vinifera*, confirm an early acquaintance with cultivated plants (Tosi, personal communication).

If one categorizes the site of the prehistoric mound of Hesār according to some geo-ecological criteria, the resulting picture is virtually typical for the settlement sites on the Iranian Plateau.

Hesār lies on the edge of a desert lake basin at the foot of an alluvial fan. The average precipitation of 92 mm/a over a span of many years does not suffice for dry farming. Moreover, the rate of precipitation shows a wide range of fluctuation and has a thoroughly episodic character, so that even assuming a previously higher precipitation continual dry farming can scarcely have been possible. Nonetheless, Hesār's water supply can be designated as having been relatively secure, determined by a « triple hydrotrope combination » (the perennial Dāmghān Rud, the minimal disparity between the ground water and field level, and the precipitation sheet floods on the Dāmghān alluvial fan) which provided a soil forming substratum. On the other hand no brown formed horizon could be found as proof of soil formation in the ancient settlement area (it's a question here of Lithole semi-arid areas). The mineral content of the cast-up alluvia, however, was sufficient for early agriculture.

The early settlers presumably met ecological crises by a strategy of economic exploitation by which they could make the resources along the « ecological gradient » from the *kavir* to the mountain range available relatively quickly. Thus, an area extending ca. 80 km. horizontally, and over 1500 m. vertically, was exploited, as is shown from evidence excavated at Tappeh Hesār. When the results of analyses carried out on the bones and seeds recovered during the 1976 excavations on Tappeh Hesār are available it will be possible to postulate the changing emphases within the adaptive strategy of the prehistoric inhabitants over time.

At the foot of the alluvial fan, (i.e., in the lower third of this three-dimensional utilization system, since water and soil forming substrata were available), primitive irrigation farming was carried out, presumably by means of sealing off small hills around plots (border and furrow), as it is still practiced today in the region. In winter sheep and goat could and can be pastured in this area and further toward the *kavir*. The settlers may well have been cognizant relatively early of the importance of the droppings of herd animals for fertilizing the fields.

The dichotomy between farming and grazing had already evolved with the beginning of animal domestication and the start of wheat cultivation. The subsistence strategy of exploiting the resources of the entire « ecogradient » *kavir*-to-mountain range may be designated as characteristic of the entire Iranian Plateau and its border areas as early as the fifth millennium B.C.

III. THE DISTRIBUTION OF INDUSTRIAL DEBRIS ON THE SURFACE OF TAPPEH HESĀR AS AN INDICATION OF ACTIVITY AREAS

Maurizio Tosi

Introductory remarks

A surface survey was carried out from the 10th to the 25th of September 1976 in order to determine the location, areal extent, and types of industrial debris lying over the surface of Tappeh Hesār. The aim was to establish the degree of clustering of metal slags, stone *débitage*, or pottery wasters and to make a quantitative estimate of the incidence of each of these activity areas over the total surface of the site. Locational analyses, such as those used in the study of human geography, can then be used to interpret this information with the aim of evaluating the magnitude and relative importance of the various specialized craft activities in relation to the socio-economic pattern of a settlement. Although a broad spectrum of variables must be evaluated before an acceptable degree of reliability is reached for archaeological data, locational studies have recently met with increasing interest amongst scholars working in the Middle East (Redman, Watson 1970; Possehl 1973; Speth, Johnson 1976; Tosi 1976).

Furthermore, the importance of craft specialization as a determinant of state growth has been broadly accepted since V.G. Childe included it among his famous ten criteria for the identification of developed urbanism from an archaeological context (1950:11).

The method employed in the survey was to walk the entire surface of the mound noting the raw materials, *débitage*, blank forms, tools, slag, and wasters from any manufacturing process. Both single findspots and clusters were marked on Schmidts' plan (approx. 1:2800; Schmidt 1937; fig. 16). Areas were classified both in terms of presence/absence of materials and in terms of the degree of clustering over Schmidt's spatial units (10 m² : 100 m²). The occurrence of industrial debris was recorded as concentrations of « low » or « high » density. Concentrations between 20 and 200 items per 10 m², were classified as « low-density » areas, while « high-density » areas were areas where items on the ground ran well over 200 per 10 m², (pl. III). The disturbed state of the partly excavated site invalidated any greater sophistication of effort aimed at producing the kind of quantifiable data (raw frequency counts) suggested by Speth and Johnson (1976: 36-48) in the absence of chronological controls.

We believe, however, that the results obtained, combined with test excavations, have succeeded in fulfilling the aim of the survey: namely, the identification of possible specialized craft areas at Tappeh Hesār which could provide a beginning base for the comparison of the organization of the settlement with that of

similar protohistoric towns in eastern Iran and Central Asia (Tosi 1977b: 57-60). In effect the 1976 survey continued and completed the work done by G.M. Bulgarelli in 1972 which succeeded in defining the role of Hesār in the ancient lapis lazuli trade beyond the conclusions drawn by Schmidt in 1937 (Bulgarelli 1974; Tosi 1974a). The 1976 survey has thus extended this specialized study to a wider range of data. The result has been the identification of distinct activity areas: metal smelting is evidenced by the presence of slag, furnace linings, and melting crucibles; working areas for semi-precious stones by great numbers of lapis lazuli chips and associated lithic tool assemblages; bead-making by limestone, soapstone, and other less precious bead materials and partly finished beads; and pottery-making by kilns and vitrified wasters.

The following report presents the broad results obtained from the 1976 survey, identifying the various craft areas and describing the characteristic of clusters of manufacturing debris which contribute to our understanding of the manufacturing processes at Hesār during the late fourth and third millennia B.C.

Activity Areas

The information collected on the distribution of industrial debris at Tappeh Hesār in 1976 can be roughly related to the pottery horizons labelled by Schmidt IIA, IIB, and IIIA on the basis of excavated cemetery materials (Schmidt 1937). In 1965 it had been proposed that these horizons be correlated with the Early Dynastic and Agade periods in Mesopotamia (Dyson 1965:238-40, fig. 1) but these correlations must be revised on present evidence to the Jemdet Nasr and Early Dynastic periods (i.e. late fourth and first half of the third millennia B.C.). This is a long span of time covering perhaps 700 years which includes the formative period of the earliest urban or state societies in eastern Iran (Tosi 1977b).

The best-evidenced activity areas at Tappeh Hesār have been located in the southwestern section of the site where later period III levels did not exist or have been removed by excavation. The highest surface concentration of most types of industrial debris occurred on and in the excavated dumps of *South Hill*. A few low-density areas or small clusters occurred elsewhere on the site where levels of the same period have been disturbed. A line drawn NW-SE between the *Main Mound* (largely period III on the surface) and *South Hill* separates the most exposed activity areas on the south-west from the smaller ones on the rest of the site. There is some reason to believe that

these other smaller exposures date to the early part of period II and may represent a time when the spatial craft organization of the town was less developed than later on. The exact chronological placement of these remains, however, will depend upon future study.

From the cluster chart it appears that during the early third millennium B.C. the southwestern part of Hesār developed into a multi-functional activity area, with features of a craftsmen's quarter where metal, stone, bone/horn, and pottery were being worked simultaneously in different combinations over a period of some centuries. Notwithstanding the heavy alterations suffered by the site from erosion and excavation, the present extent of the *South Hill* area, close to 1/8 of the total surface, is such that there is little doubt of the quarter having been quite large. The close proximity of such a range of specialized activities indirectly confirms the fact that sophisticated objects, weapons, and tools such as those found by Schmidt in the graves and in the Burned Building probably were manufactured at Hesār.

Metal Working

Among the industrial debris, metal slag covers by far the largest proportion of the surface with a total of 11,000 m². (i.e., 9.15% of the whole preserved archaeological site). Almost all of this debris is slag from copper smelting, an operation that produces a large enough quantity of indestructible waste products to justify its high percentage incidence among all activity remains. Quite significant also in view of future research work, is the discovery of a certain quantity of *litarge* and other by-products of lead/silver ore smelting at *South Hill* and the *Twins*. Outside the high-density concentrations, copper slag is found scattered over the rest of the site at an average of about 4 per 10 m².

There are greater areas of low-density concentrations of metal slag than there are of high ones. Both the survey and the related test excavations have established that these large areas of low density result from the redistribution of slag deposits as the result of recent disturbances. A good example of such redistribution can be seen in the strip of slag at the edge of *South Hill*. It is a long stretch, running about 130 m. west northwest - east southeast, along the northern side of square EG. Slag is clearly aligned along the contour lines between + 13 and + 12.5 m., according to the direction of plough furrows. The low-density distribution of the slag originates from the erosion of an ancient dumping yard located in the southwest sector of the *South Hill* which has been progressively sliced through by the plough. The original location of the slag deposit is suggested by the 1976 excavation of square DF89 where it was likely to have been stratified beside the metalsmith's work-shop.

It follows that one may safely identify as «workshop area» only the high density concentrations seen on the surface of a site, the low-density ones depending on variables often not directly related to primary deposition.

Three areas of high-density clustering can be



Fig. 1 - Tappeh Hesār. The *Twins* seen from North. Erosion surface with scattered slags of copper smelting process.

associated at Hesār with the process of metal-smelting (fig. 2, pl. III):

a. At the *Twins* a slag scatter was found which covers 8100 m², by far the largest found and a remarkably specialized area for a relatively small site such as Tappeh Hesār (fig. 1). Schmidt excavated two test trenches on the top and on the western side at the bottom of the main hillock of the *Twins*. Finds and structures from the top were identified as belonging to period III (1937: fig. 86), those at bottom, in square FF95, to II (1937 fig. 61). The metal-working debris found in the area in 1976 included both slag and vitrified furnace linings which were scattered around both hillocks as a result of heavy erosional processes. The debris originates from levels underlying the period III structures. One of the aims of R. Biscione's excavations in FF95 was to investigate the original context of the slag accumulation.

b. A second high-density area of copper slag was located alongside the south-western flank of *South Hill*. Here the type of finds, slag and furnace linings, are similar to those of the *Twins*, although the size of the cluster is much smaller, about 500 m². As stated above most of this area appears to have been destroyed by ploughing.

c. The third area of copper slag clustering lies within square DH87/97, close to the southeast edge of the northern mound system, and covers approximately 150 m² of surface. It is a small patch of slag sloping downhill, its dispersion due most probably to deep ploughing. This slag appears to be of a different type from that found at the *Twins* or *South Hill*. Pieces are larger in size on the average, more uniform in color, glazing and shape, and have a minimal residual copper content. These features suggest the presence of a more efficient processing method, quite different from the

usual prehistoric copper smelting products (G. Weisgerber, personal communication).

Most low-density slag scatters occur around *South Hill* or in the southern half of the site, strengthening the hypothesis that this part of the settlement may have assumed a special role at the beginning of the third millennium B.C. A few other scatters have been located elsewhere at Hesār, the largest on the *Painted Pottery Flat* in the area between *Treasure Hill* and *Red Hill*. Slag found here is of the «earlier» type, similar to that found on *South Hill* and *Twins*. It clusters along the northern side of DH21, a test trench dug by Schmidt. On the *Main Mound* and the *North Flag* slag is much rarer. A few clusters such as in CG15 can be recognized *in situ* but they are unexcavated and the degree of visible clustering is very low, so that they can have no particular relevance at this stage of work although they appear to date early in period II.

It may be concluded, therefore, that metal-working and particularly copper-smelting, was extensively carried out at Hesār during Schmidt's periods II-III A when a concentration of major workshop is reflected by the archaeological activity areas found in the southwestern quarters of the town.

One of the most striking results of the 1931-32 campaigns was the discovery of highly sophisticated objects, produced in all the metals worked during the third millennium B.C.: copper, lead, silver, tin and gold. The present study has documented from the very beginning the fact that this outstanding production took place at Hesār to such an extent that a high proportion of the site was littered by the debris of that activity.

Lapis lazuli and semiprecious stones

The second part of the survey for the location of functional areas at Tappeh Hesār was concerned with lapis lazuli and flint *débitage*. This work provided a follow-up study to the earlier reconnaissance done by G.M. Bulgarelli in 1972 (Bulgarelli 1973; 1974) which was initiated as a result of the discovery of a lapis-working tool kit as well as a working area at the site of Šahr-e Sūxtēh (Tosi, Piperno 1973; Biscione et al. 1974; Tosi 1974a; 1974b; 1974c; Piperno 1976). However, the 1972 survey left several questions unanswered due to the restriction of time and resources. First of all the survey was not able to cover the entire surface of the site, so that a complete picture of the distribution of the stone-working debris was not obtained. It also proved impossible to sort out the various clusters of debris and to associate them with different occupational phases. Finally, lack of controlled excavations made it impossible to check the complete range of tools associated with the process of making beads.

The data collected in 1976 have provided a better answer to all these questions. The surface survey was extended to the whole site and three new high-density concentrations were identified. Other areas were located during excavations, mostly through water-separation processes of soil samples from CF57 (*North Flat*), CG90/DF09 (*Main Mound*) and FF94 (the *Twins*) (fig. 1). As in the case of the metal slag, single lapis



Fig. 2 - Tappeh Hesār. Close-up view of erosion surface in sq. DG80 W with concentration of lithic and lapis lazuli wasters.

lazuli chips or associated flint tools could be picked up all over the site, but considering the degree of erosion which has taken place, they have little significance. The survey regarded as true clusters only those in which lapis lazuli chips occurred in hundreds per 10 m², along with flint microliths, larger tools, and *débitage*. The association between this specialized assemblage and the lapis lazuli is derived not only from the high incidence of flint flakes, drills, backed tools and burin blows within every cluster of associated *débitage*, but also by virtue of the occurrence of similar assemblages at other settlements involved in the manufacture and trade of semiprecious stones in protohistoric Iran and Central Asia (Tosi 1977).

At Tappeh Hesār this tool assemblage was first identified by Bulgarelli's work on the western slope of the *Main Mound* (1974:20). This specific cluster included very little lapis lazuli although the flint debris had been deposited on the surface in a thick mantle over squares DF37, DF38, DF47, DF 48, DF49 (i.e., the northern side of the artificial gulch which runs between *South Hill* and the *Main Mound*). The scarcity of lapis lazuli may have been purely incidental, considering that in 1976 an identical concentration of flint, rather rich in small blue-stained flakes and blanks, was located a few meters away on the southern side of the same gulch.

On the northern half of the site a significant cluster of lapis debris was located by R.H. Dyson in CF57 (*North Flat*) in a stratigraphic context dating to the earliest part of period II (Part III). Nevertheless, soon after the beginning of the 1976 survey it became apparent that the primary area for visible remains of the working of lapis lazuli and semi-precious stones was the *South Hill* where the *débitage* was intermixed on the surface with metal slag. Lapis lazuli chips and flint flakes and tools were collected along the eastern slope of the *South Hill*, partly originating from Schmidt's trench in DG53. By far the greatest concentration on the *South Hill* was located in DF89/DG80 where subsequent excavations exposed the thick dump of a stone-cutter's workshop (fig. 2).

This large concentration of lapis lazuli and flint in DF89/DG80 was first located by R.H. Dyson on

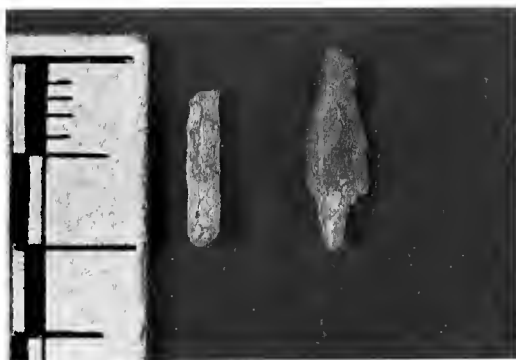


Fig. 3 - Tappeh Hesār. Flint drill bits with lapis lazuli stains from surface collection in sq. DG80 W.

September 13. In the following days the area was carefully cleared off, all specimens occurring on the surface were gathered, the details of their distribution and the size of the area were recorded. The debris formed a strip along the eastern edge of Schmidt's trench in DF89 where the soil had been dumped along the side. Over the years this piled earth had slid backwards and the wind had cleared the top of the lighter particles, increasing the concentration of lapis lazuli flakes and blue-stained flint tools (fig. 8). After taking off the loose soil the original deposit was found and a new face was cut into the section in DG80 about 0.50 m. behind the existing one (pl. IV).

The section showed two main stratigraphic episodes in a total thickness averaging 1 m. The upper one (layers ① - ⑤ in pl. IV) was a series of thick layers of loose soil, full of disarticulated human bones, sherds and roller clay lumps, mostly redeposited from Schmidt's excavations in a disturbed burial ground (1937: fig. 62, DF70). The aerial photograph of Tappeh Hesār taken by Schmidt three years after the closing of the dig, on September 23, 1935 shows a large dump on top of DG80 (Schmidt 1940: pl. 44). This was partly levelled before the beginning of the work in 1976. Layer ②, a 10-30 cm. thick rain-laid silt might have been part of an earlier disturbance, a shallow pit that destroyed the lowermost floor at this point and was filled by ③.

The lower stratigraphic episode (layers ⑥ - ⑩ in pl. IV) corresponded to an intact deposit, where lapis lazuli flakes and the associated lithic industry were found lying thickly *in situ*. They were mostly contained in lenses of soft brownish soil ⑨ that originally must have been rich in organic matter. Grey ash was layered within this soil associated with a remarkable percentage of tools and bluestained flakes. Charcoal and bone was rare. A 6-10 cm. thick layer of compact clay ⑦ covered the ash-trash deposit and was interrupted by a few charcoal lenses. It seemed to be an exposed surface consisting of decayed mud brick. The grey ash related to the primary deposit of the lithic assemblage, which extended only 5 m. and which appeared to be contained within a space delimited by two walls, and a floor. It would appear that this situation represented

a room previously abandoned or collapsed into itself forming a kind of penyard which later was filled with trash including the debris from bead production from a nearby work shop. The built-up of clay during the period in which the space lay abandoned can be seen clearly in deposit ① accumulated at the walls over the floor. Evidence that the workshop was nearby can be seen in the quantities of blue lapis dust, chips, etc. spread in patches over the area. The blue dust often coated the flint flakes in a manner uncharacteristic of the blue stains from use and it seems probable that the daily debris from bead-making was dumped into the abandoned area.

To the south and north of the grey ash area the stratigraphy of the DF89 section was quite different, a fact which suggests that the dump from the lapis lazuli workshop was restricted to the «yard» within the walls. A shallow pit had disturbed (presumably at an earlier date than Schmidt's excavations) the deposits to the south toward the slope of the hill. The loose rubble of the layer ⑥ was directly capped by rain-laid silt ②. A floor directly related to the one below the grey ash deposit had been almost totally destroyed by the pit. To the north the same floor level continued beyond a re-used double wall which was in part earlier and in part later than the lapis lazuli deposit. This northern floor level was overlain by a different stratigraphic series: layer ⑧ lying on the floor consisted of loose earth rich in cultural remains, mainly sherds, with no lapis lazuli or associated flints. Over this layer was a fill of almost intact mud brick ⑦ 50 cm. thick. The surface of this layer ⑥, hardened by prolonged exposure, was later cut by the shallow pit of grave DG80/13/.

This grave lay just below the present ground surface and was undoubtedly related to the South Hill cemetery, a large cluster of burials excavated by Schmidt mostly in DG70 (1937: fig. 18).

Thus, from a stratigraphic point of view, the lapis lazuli dump was laid down gradually between the walls of the abandoned room which formed a sort of «courtyard» while an additional room adjoining this to the north was being filled in by a coarse deposit of loose bricks. Both the dump area and the hardened brick room fill later became part of a burial ground when most of the area had apparently changed its function. The sherds collected from these deposits indicate that the occupation was related to a terminal phase of period IIB in terms of Schmidt's ceramic chronology. The correlation of this chronological sequence (based as it was primarily on grave goods) with actual occupation levels, however, remains problematical. Therefore, once the importance of the area and its connection with both metal working and lapis lazuli processing were recognized, the need was to establish a local stratigraphic sequence valid for *South Hill* into which the grey ash layers could be properly placed and which could then be used for comparison with other local sequences for the reconsideration of chronological and occupational sequences of the site as a whole. The discussion of the local sequence for the *South Hill* is developed separately later in this report.

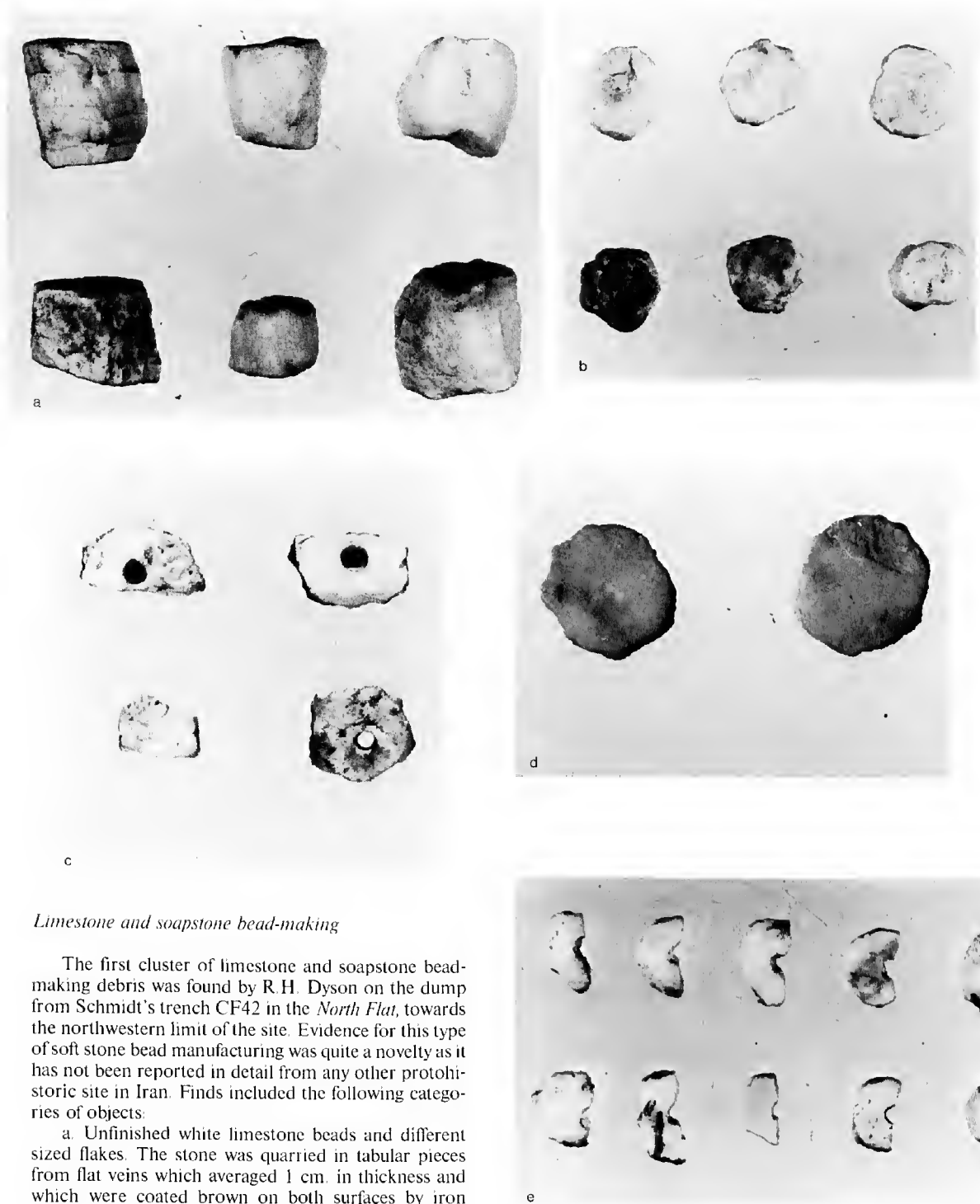


Fig. 4 - Tappeh Hesār. Unfinished limestone beads from CF 43: *a*, limestone cubic blocks; *b*, roughly rounded blocks; *c*, beads in course of perforation left specimen; *d*, disk-shaped beads with earliest stage of perforation on left specimen; *e*, misdrilled beads.

Limestone and soapstone bead-making

The first cluster of limestone and soapstone bead-making debris was found by R. H. Dyson on the dump from Schmidt's trench CF42 in the *North Flat*, towards the northwestern limit of the site. Evidence for this type of soft stone bead manufacturing was quite a novelty as it has not been reported in detail from any other protohistoric site in Iran. Finds included the following categories of objects:

a. Unfinished white limestone beads and different sized flakes. The stone was quarried in tabular pieces from flat veins which averaged 1 cm. in thickness and which were coated brown on both surfaces by iron oxides (fig. 4).

b. Unfinished beads, blocks and associated chips of soapstone ranging in color from light green to dark grey. This soapstone contains a fair quantity of micaceous impurities and can be regarded as a variety of what is commonly though erroneously called steatite



Fig. 5 - Tappeh Hesār. Wasters and unfinished beads of soapstone in a photographic reconstruction assembling surface finds from sq. CF42.

although it resembles only slightly the green/grey stone employed at Tappeh Yahya and Sahr-e Sūxteh (fig. 5).

c. Unfinished squarish beads of soapstone which has been heated and transformed into a harder, whitish material. The method is well known from the Indus valley during the Harappan period (Sankalia 1970:44-45). The discovery of this material at Tappeh Hesār establishes the fact that this technique was used on the northern Iranian plateau at an early date.

d. Twelve very small chips of lapis lazuli.

e. Blades, shouldered microlithic drills and flakes of flint.

f. Two apparently unworked crystals of chalcedony.

All of these materials were lying on the very top of the earth dumped by the previous excavator on the northern side of CF42. A few heavier limestone cores were found nearby, the largest weighing 20 gr. The surface around the test trench was scraped with a trowel and the collected samples were cleaned in a 1.6 mm. sieve. The highest *débitage* density was located within the northwestern quadrant of the square, over an area of about 5 m², strictly limited to the uppermost part of the soil heap. The material is likely to have originated in a restricted area of CF42 at the bottom of the trench. Schmidt assigned the finds from the trench to periods II and III with sporadic occurrences from I (1937: figs. 21, 61, 83).

This association of limestone and soapstone bead-making in a single activity area was paralleled by the discovery of a second concentration on *South Hill* in squares DG81/DG82. This concentration covered about 100 m², a size comparable to CF42 if we regard that occurrence as originating from the whole square. Finds from DG81/DG82 included the same categories of objects, with the difference that here as the result of excavation the activity area can be seen on the western edge to have bordered the large «lapis lazuli workshop surface» of DF89/DG80.

A great number of blue-stained flakes and associated flints were mixed with the limestone/soapstone surface materials. Although these two or three bead-making processes might have been carried out close

to one another or even in the same house unit, nevertheless, they should be regarded as distinct activities as the type of processing was quite different and required separate operational sequences. In terms of more general considerations, the evidence further indicated the degree of specialization reached by craftsmen in eastern Iranian towns of the third millennium B.C. Stone working required special skills - a fact which may reflect the development of different labour units (Tosi 1977: 58-59). The clearest evidence for this kind of specialization comes from the Sahr-e Sūxteh graveyard, where individuals associated with the manufacture of imported semiprecious stones such as turquoise and lapis lazuli were buried separately from those dealing with local materials as chalcedony and chlorite. Each individual was furnished with a basic tool kit (Piperno 1976).

On the eastern edge of the *Painted Pottery Flat* another area of limestone debris was located. In this instance no soapstone was found in association. The activity area seems related to Schmidt's test trench in DH21, assigned by him to his periods I and II (1937: figs. 21, 61). The concentration was low-density in squares DH11/ DH12/ DH22. The limestone is of the same brown-coated white variety already described from the *North Flat* and *South Hill*. In this area a more complete assortment of the shapes being manufactured was ascertained from the finished and unfinished examples found. The shapes include:

- | | |
|------------------------------|-------------|
| a. thin cylinders | 3 specimens |
| b. centrally-pierced squares | 1 specimen |
| c. laterally-pierced squares | 2 specimens |
| d. disks | 1 specimen |
| e. unfinished cylinders | 3 specimens |
| f. unfinished squares | 1 specimen |

A comparison of the finds from all three activity areas provides evidence for an initial reconstruction of the operations employed in the manufacture of both the limestone and the soapstone beads. In general the production of stone beads requires these stages of work no matter what kind of material or what type of lithic tools were employed. These stages were first established for lapis lazuli bead-making at Sahr-e Sūxteh (Biscione et al 1974: fig. 10), and confirmed at Tappeh Hesār (Bulgarelli 1974: 26-27) where they are similar for limestone and soapstone. The basic stages include:

- a. Reduction of the raw stone to the basic size required for the bead.
- b. Rough shaping of the bead by smoothing (lapis lazuli, turquoise) or flaking (chalcedony, limestone).
- c. Drilling (many beads split at this stage still showing the unfinished shape).
- d. Finishing (smoothing, polishing, engraving, etching, etc.).

According to G.M. Bulgarelli, the reconstruction of the manufacturing process of limestone beads is less safely grounded because of the more restricted amount of data available and the kind of material worked anyway some preliminary remarks can be quite safely suggested:

1. Following diachlases lines there were produced 0.5-1.0 cm. flat plates that could be segmented in the shape of almost cubic blocks (fig. 4a);
2. By chipping of the edges tiny flakes were removed

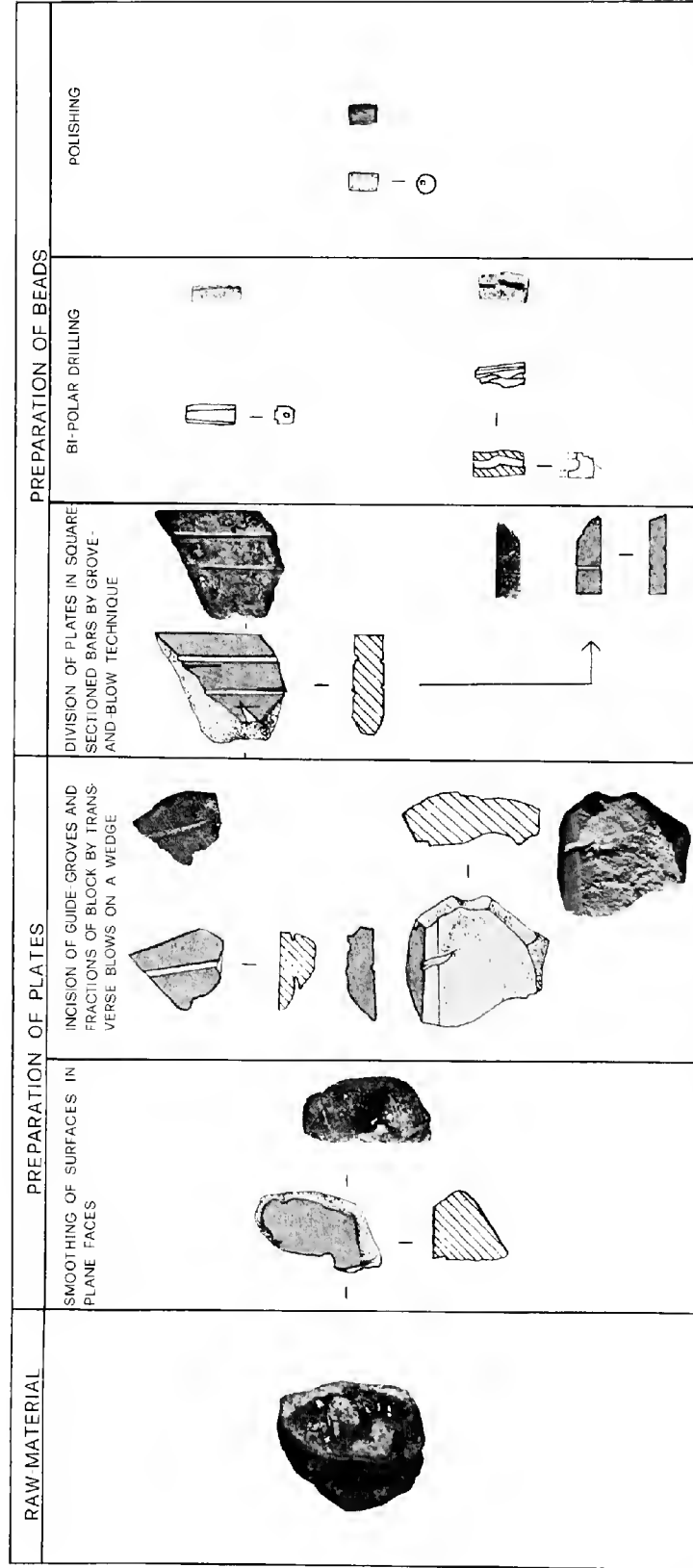


Fig. 6 - Tappeh Hesar. Manufacturing stages in the production of soapstone beads as documented by wasters from sq. CF42, DH11, DG12 and DH22 (Drawing by I. Reindell 1:1 scale).

to round the section of the small blocks, that this way became roughly cylinder-shaped. Both bases were smoothed to parallel platforms (fig. 4*b*);

3. Drilling was then carried out on the flat ends in the usual bi-polar fashion. There is evidence on some roughs that to center and fasten the drill a small flake was first removed (figs. 4*c*; 4*d*) the comparative large amount of split semidrilled beads found in CF42 (fig. 4*e*), supports that misdrillings were more frequent, probably as a correspondance of the cristalline structure of the limestone.

The larger amount of material found has allowed a schematic reconstruction of the entire manufacturing process of soapstone beads (fig. 6). This process we have subdivided in two main stages: 1. preparation of plates and 2. shaping of beads.

Plates were produced from the nodules of soapstone by smoothing one or more sections of its surface, on the platform derived were cut one or more 1 mm. thick grooves by means of a flint flake or blade, with the purpose to guide the cutting of the plates, finished by transverse blows on a wedge as can be easily followed on the splinters illustrated on fig. 5.

These plates, on average 0,5 cm thick, were finally ground to provide well finished working surfaces where grooves were cut to shape square sectioned bars (fig. 7-8).

Further grounding around the edges could make those bars into cylinders beads, or they were segmented by transverse blows into roughs for disk beads.

Perforation was bipolarly carried out and, as often recorded on semi-precious stones, it preceded final polishing to reduce loss of time for the frequent misdrills.

The distribution of the limestone and soapstone debris at Tappeh Hesār is quite similar to that of the lapis lazuli: a random presence all over the site, isolated low- and high-density spreads in the northern and eastern sections of the *Main Mound* complex, a large activity area on *South Hill* adjoining and intermixing with high-density clusters of other by-products.

Pottery kilns

The 1976 survey of activity areas at Tappeh Hesār was far from exhaustive if the total number of manufacturing processes are considered which must have been carried out at the site as indicated by the many classes of materials recovered by Schmidt's excavations. Surprisingly the 1976 survey identified only the slightest evidence for what must have been the largest and most space-demanding of all activities in the town: pottery manufacturing. The survey failed to find red-oxidized areas associated with glazed kiln walls and warped overfired sherds which are the hallmarks of this ancient activity.

A low-density seatter of kiln wasters, possibly already in a secondary location, was pinpointed in squares BG93/ BG94/B95 on the extreme northern edge of the surviving ruins (pl. III). The oxidized walls of a poorly preserved kiln could be seen sectioned in the



Fig. 7 - Tappeh Hesār. Soapstone plate with parallel grooves incised to segment roughs for cylindrical beads.



Fig. 8 - Tappeh Hesār. Side view of small soapstone plate with preparation groove for bead-making.

southern face of DG53, one of Schmidt's test trenches on *South Hill*, along with an associated scatter of vitrified wasters which had rolled down a nearby slope. This paucity of evidence for the manufacture of pottery (which occurs in great quantity at the site) may be due to the fact that much of the exposed surface is eroded away, or it may be due to much of the manufacturing having been carried out away from the central settlement at satellite sites in the manner documented for Sistān during the second half of the third millennium B.C. (Tosi 1971; Lamberg-Karlovsky and Tosi 1973: 23-24) or for the Indus Civilization settlements localized in Cholistan along the Hakra valley (M.R. Mughal, personal communication). Both explanations might hold good, considering the long chronological perspective at Tappeh Hesār and the high degree of erosion that has affected all ancient sites on the Dāmghān piedmont plain. On the other hand, it must be admitted that no evidence for such satellite kiln sites has been recorded in the site survey carried out on the plain by K. Maurer Trinkaus (Part XV). It is thus, at the present time, impossible to argue for any specialized quarter for the production of pottery.



Fig. 9 - Tappeh Hesār. Up-draught pottery kilns in sq. DF78/88 as seen from North.

Evidence does occur, however, for the presence of widely scattered kilns in the main settlement. In the course of the 1976 season important new information was acquired on structural remains already unearthed by Schmidt and badly weathered. An outstanding find was made by S. Howard and V. Pigott in square CG90 of the *Main Mound* where a well-preserved red-fired pottery kiln built adjacent to a neighboring domestic structure came to light (Part VI). Another rectangular kiln was excavated by Schmidt in the North Flat in period IIIC (Schmidt 1937: fig. 103, CF39, S8).

Additional evidence came from *South Hill* after walls in squares DF88/DF89 had been cleared of their coating of melted clay and vegetation. These structures formed a group of small rectangular rooms identified by Schmidt as belonging to houses of his periods IB and IIIA (1937: 106-107). One room was numbered as section 4 on his plan (1937: fig. 63), while another (which contained a bin-like structure in the northeast corner) in DF89 was designated as «living-room 2». These and two other structures aligned in a northwest-southeast direction in squares DF88/DF89 were identified as kilns and were numbered 1 to 4 (fig. 9). It is likely that Schmidt failed to identify them not only because they were not burned red but also because he apparently did not regard a concentration of wasters as a cultural indicator worth noting. In addition it may be noted that this type of pottery kiln was little known at that time. All five examples located on the *Main*

Mound and the *South Hill* can be described as rectangular-plan, horizontal or up-draught kilns (although it should be noted that the kilns in the two areas are not identical). These rectangular kilns are different in plan and construction from the round-plan, vertical or up-draught ones, the type most common in prehistoric, Roman and Medieval Europe. In horizontal kilns the firing chamber and the fuel pit are at opposite ends of the rectangular space. The heat produced near the entrance is drawn by one or more chimneys opening on top of the firing chamber at the other end of the room. None of the devices required for the vertical kilns – refractory grid, heavy pilasters, vaulted ceiling – are required at all. Moreover in the horizontal kilns the smaller size of the fire-pit necessary to produce oxidizing temperatures for each cubic meter of space would have reduced the consumption of fuel, thereby maximizing the use of heat. It is not surprising that this type of kiln became predominant in the arid territories of Indo-Iran and Central Asia between 3000 and 1800 B.C. when it was extensively adopted by the largest proto-urban centers in Sistān (Tosi 1971), southern Turkmenia (Masimov 1973), and Cholistan (M.R. Mughal, personal communication).

The kilns located at Tappeh Hesār in DF88 and DF89 belong to the latest phase of the occupational sequence established by excavation on *South Hill* (Part V). Kilns 1, 2 and 3 were built together in a single row with their openings to the prevailing winds from



Fig. 10 - Tappeh Hesār. Kiln 1 seen from NW. To the right test stripping of floor uncovering buried human skull from grave underneath. Note vertical setting of mud-brick wall.

the north-northwest, each having a side wall common with the one next to it (fig. 9). Kiln 4 lay less than 2 m. to the east of kiln 3 and set in the ruins of an earlier room is a slightly different fashion but opening in the same direction.

A description of the construction technique has to rely almost totally on the evidence of kiln 1, the best preserved specimen (fig. 10). The kiln area was roughly levelled and the floor prepared with a pavement of irregular bricks. As was common practice in protohistoric settlements, earlier structures were carefully incorporated to strengthen any new construction. This happened in the case of kiln 1 at its southwestern corner and along its northern side. In building the Kiln no heed was given to a burial which occupied the spot and the skull remained just a few centimeters below the

western edge of the floor (fig. 10). The outer wall of the kiln was laid at the same time as the floor, partly on top of its edge, with large rectangular bricks (55 x 21/23 x 12 cm.) set vertically in a fashion closely resembling the kilns of Tappeh Rud-e Biyabān 2 in Sistān (Tosi, 1971). The fire-pit was a shallow rectangular basin (ca. 128 x 82 cm.) built with irregular broken bricks in the northwest corner of the room. An identical basin can also be seen in the northwest corner of nearby kiln 2. The rest of the short northern side was taken up by a narrow opening, 48 cm. wide which provided access for the potters. A thick continuous coat of plaster was laid on the floor, the firepit basin and on the walls.

The short southern side of kiln 1 would have been occupied by chimneys to draw and regulate the firing stream. A squarish pilaster made of bricks projected



Fig. 11 - Tappeh Rud-i Biyabān 2. Close-up view of walling system in kiln 48 (cfr. 2400 B.C.) as comparable technique of kiln 1 at Tappeh Hesar sq. DF78/88.

from the center of the south wall and divided the chamber into two halves, in effect giving the kiln the characteristic Y-shaped plan first identified at Tappeh Rud-e Biyabān (fig. 11). Parts of the ceiling or the vaulting of the chimneys were preserved in the southwest corner. The curving dome was realized with layers of sherds, a good refractory material, arranged in two or three superimposed layers. These layers were firmly held by thick coats of plaster (fig. 12). In this one corner the plaster was fired red around an opening by the high temperature of the outgoing air. The weight of the chimney vaults was supported by the small partition wall, 25 cm. thick, which divided the firing chamber and which acted as a supporting pilaster.

It is quite likely that the exterior of the kiln, with a total height of ca. 83 cm., was flat-roofed, with a brick platform on top. In kiln 2 the height of the firing chamber at the southwest corner was 67 cm. The available volume of the kiln's firing chamber can be reckoned between 2 and 3 m³. This is the same size as the Tappeh Rud-e Biyabān kilns and slightly smaller than the largest specimens of the horizontal and vertical types found by Masson and Masimov at Altyn depe (Masimov 1976, figs. 4-7).

No wasters or any other indications of potter's activity were found in the badly eroded kilns. Schmidt's 1935 aerial photograph shows that soil from this part of



Fig. 12 - Tappeh Hesar. Vaulting in SW corner of kiln 1 in sq. DF 88.

South Hill was mostly dumped to the west, following different *decaville* tracks (pl. III). Some vitrified slag, possibly associated with pottery firing, was found embedded in the eroded clay of kiln 2. This kiln had been destroyed by Schmidt's workers who had excavated about 60 cm. below its floor. This vitrified slag could also be an indication that the area had been used for pottery making at an earlier stage of the sequence.

Kiln 4 (DF79 / 3/) lay within Schmidt's room 2 and made use of that earlier structure with a variant form as a result. Building materials had been salvaged from nearby structures and the masonry was less well done. The entrance opened to the north making use of the earlier door to the building. The fire-pit was built to the west of the door in a trapezoidal fashion with a sherd flooring which survives in the southwestern corner of the firing chamber. The kiln was somewhat smaller than kilns 2 and 3, measuring 2.40 x 1.20 m. The walls were rather thin, made of a single line of carelessly laid bricks. Oxidizing was pronounced, a fact which may reflect better preservation as Schmidt refuse was concentrated in the eastern half of the kiln chamber and beyond to the walls of the earlier room. A basin in the chamber measured 70 x 40 cm., proportionally smaller than those in kilns 1 and 2. The basin was later reused for a burial which was accompanied by a single black-burnished bowl.

In the light of the available stratigraphic data there is no way of establishing the degree of contemporaneity between the four kilns of DF88/DF89, the one surviving in DG53/ DF63, and the associated wasters on the eastern slope of *South Hill*. All together they suggest that a certain amount of pottery was produced on *South Hill* in close proximity to other manufacturing activities which were occurring simultaneously or which had been present in the area at a slightly earlier date. Clearly four kilns cannot have produced the quantity of vessels used at Hesār during the fourth and third millennia B.C. and the potter's quarter, if such exists, remains to be found.

Calcite and alabaster

A final question will have to be raised before concluding this preliminary report on the surface survey at Tappeh Hesār: is there any important manufacturing process that might have been totally missed among these apt to survive a prolonged exposure to erosion? The answer can only be based on the evidence of the wealth of Hesār as documented by the finds of Schmidt. Most conspicuous in the 1976 survey is the absence of calcite or alabaster, objects of this material being some of the most impressive and widely published items from the site. This stone is not rare in eastern Iran, although sources for it have not yet been reported in this part of the Alborz. The movement of lapis lazuli to Hesār from Afghanistan shows, however, that distance was no constraint. Nevertheless, the source remains obscure. Unlike the other stone materials

discussed, calcite and alabaster not only fail to occur in activity areas but only a few random chips of the material were found anywhere and these were mostly pebbles of alluvial origin. The test excavations undertaken in 1976 did not add to the evidence. It should not be forgotten, however, that alabaster left over from vessel-making can be re-used almost entirely for beads, figurines, and other small objects - reuse which have been highly susceptible to erosion.

In this connection consider the chronological distribution of the excavated calcite/alabaster objects. Schmidt was very direct in his statement: «Stone vessels occurred at Tepe Hissar solely in the uppermost sustratum (IIIC). They are guide specimens for their time...» (1937:212), and «(Miniature columns)...are also guide specimens of Hissar IIIC. Quite a number of them occurred in the hoards of the Treasure Hill, others were found in the top layer of the site, or in Hissar IIIC graves...» (*ibid*: 216). The violin-shaped female figurine H 3500, so reminiscent of the Treasure of Astarabad, came from the second hoard of Hesār IIIC (*ibid*: 191, fig. 114). It seems clear that the stone became plentiful only in the latest period of life at Hesār. Schmidt's publications document the disturbances made by the cutting of these rich graves and «hoards» into the top of period II and IIIB structures. It is clear that alabaster was manufactured only in the latest period, the most eroded and most poorly documented of all the occupational phases. It may be noted further that calcite/alabaster manufacturing debris is rare also in other parts of eastern Iran. The only exception is Šahr-e Sūxteh and Sistān in general, where there is an abundance of varieties of this stone all around the Hilmand delta (Tosi 1969: 368). Here the stone was worked as early as the beginning of the town and a specialized activity area has been located on Tappeh Graziani, 5 km. to the east of Šahr-e Sūxteh, with a very high incidence of bead and vessel blanks over the total surface of the site. It is likely that the Sistān situation was exceptional and mainly due to the large availability of the stone in the area.

To summarize then, the surface survey of Tappeh Hesār has provided a map of activity areas within the surviving portion of the site, broadly relatable to the late fourth and third millennium B.C. occupations. From these data it was possible to ascertain, even before the test excavations were started, three major pieces of cultural information:

- a. Hesār was a major manufacturing center with an approximate proportion of 1/10 of the total surface and 1/5 of its surviving period I-II occupational deposits represented by activity areas.
- b. The place where most of the activities are evident on the surface was *South Hill*: an area presently extending over 3000 m², which can be tentatively regarded as a craftsmen's quarter.
- c. The largest metal-smelting activity area was at the *Twins*.

The results can be meaningful only when brought into a proper diachronic framework. The next phase of the 1976 field season involved excavations with this explicit goal in mind.

IV. ARCHAEO-METALLURGICAL INVESTIGATIONS AT BRONZE AGE TAPPEH HESĀR, 1976

Vincent C. Pigott

Renewed excavations at Bronze Age Tappeh Hesār provide a rare opportunity for archaeologists to study the industrialized production of various ancient technologies, among them the smelting of metals such as copper¹. Until recent investigations by the combined American-Italian-Iranian team, the importance of Hesār to the study of ancient metallurgy has remained somewhat obscure². During the course of his 1931-1932 excavations at Tappeh Hesār, Erich F. Schmidt found a fascinating array of metal artifacts yet he made no mention of the extensive slag scatter over much of the site. This slag scatter, together with the variety of metal artifacts recovered, make Hesār of particular interest among the excavated Bronze Age sites in Iran.

During the 1976 season at Hesār a series of investigations aimed at understanding ancient metallurgical technology at Hesār were initiated by Maurizio Tosi and the author. The first step in this investigation was a walking survey of the mound's surface to delineate the extent and varying density of the slag scatter (see Part III). This scatter must derive either from stratigraphic contexts long since eroded, robbed, or excavated away, or possibly from surface smelting operations. Natural agencies such as wind³ and precipitation, as well as human activities (cultivation and possibly Schmidt's excavation dumps; for their location see Schmidt's aerial photo, 1937; fig. 2) have assisted the gradual migration of pieces from zones of densest concentration. There are no recognizable slag heaps to be found at Hesār. Instead, the slag has been gradually dispersed over the mound's surface, a process which must have taken a significant amount of time. This distribution bespeaks the antiquity of smelting at the site.

The zones of densest concentration, in terms of pieces of slag per square meter, were located (table I). One particularly dense zone surrounded the mound formation to the southwest of the Main Mound known as «The Twins». At The Twins two 10 x 10 meter squares were measured out using Schmidt's original square designation, FF74 to the north and GF07 to the south. All of the surface material from these two squares which might possibly relate to metallurgical activity was collected, bagged and returned to the dig house for washing and recording (Table I). A third 10 x 10 meter square, DH96/97, was measured out in the midst of dense slag scatter resting at the extreme southern edge of the Painted Pottery Flat. This slag scatter also was collected for study.

Utilizing the samples of slag collected from the two squares near The Twins, an attempt at a typology of slag was made in order to establish a representative cross section of slag types from these squares. What resulted was a rudimentary sorting based mainly on various phases of cooling reached by the slag. The process of sorting through the slag also revealed some relevant mineral samples, including an iron oxide ore, hematite (Fe_2O_3), and fragments of ceramic smelting furnace linings. Four major descriptive categories of slag were defined:

- 1.) This is a bubbly, porous, lightweight, sharp-edged, often cinder-like slag which probably flowed molten; well exposed to the air. Often fingers of this slag form which are elongate, roundish, and smooth.

¹ Numerous helpful comments and criticisms on this paper came from Susan M. Howard and Tamara Stech. My thanks to them. I alone, however, remain responsible for its content. Paul Rissman, who worked on the initial stage of analysis of the Hesār material, took photo. Nos. 1,3,8.

² Two modern archaeo-metallurgical surveys conducted in Iran, though aware of Hesār and its significance to the culture history of the central plateau, investigated important metallogenic zones peripheral to that in which Hesār is situated. Theodore A. Wertheim's 1968 landmark expedition through the central Iranian deserts, sponsored by the Smithsonian Institution, noted Hesār's metallurgical significance (1968:927). In 1976 an extensive survey of many of Iran's ancient copper mines was conducted by a French team from the Centre National de Recherche Scientifique led by Thierry Berthoud. This team visited Hesār during our excavation season. (see Berthoud *et al.* 1978).

³ During the 1976 season we experienced several days of exceptionally severe wind, which made work impossible, and even standing difficult. A milder prevailing wind appears to blow regularly from the Alborz on the north towards the south-east. Evidence of this can be seen on the erosion-etched north face of the old Dāmghān city wall, the south face of which is relatively intact. This prevailing wind suggests that natural draft furnaces, i.e., those utilizing natural wind rather than forced draft as in bellows or blowpipe-driven smelting furnaces, could have been used. If, by chance, certain smelting furnaces at Hesār did operate by natural draft, then they would probably have been placed in areas free of obstructions such as buildings.

Furthermore, in that neither surface survey nor excavations has produced any object resembling a *tuḡvāre*, the nozzle through which a blast of air is forced into the furnace by a bellows or blowpipe, the question of how smelting furnaces at Hesār were driven remains unanswered. Further excavations at Hesār designed to investigate metallurgical problems should look into this question of natural vs. forced-draft furnaces. In addition, not only is the presence of *tuḡvāres* an enigma at Hesār but at present the use of crucibles at Hesār is definitely subject to debate as no true crucibles have yet been found at the site.

Table 1: Slag Scatter Survey Results, 1976

Square	Furnace Linings	Slag Type 1	Slag Type 2	Slag Type 3	Slag Type 4	Total Weight of Slag
(Twins) GF07	5.05	15.7	19.85	3.15	1.2	39.90 kilos
(Twins) FF74	21.85	16.0	51.7	1.1	3.2	72.00 kilos
(Painted Pottery Flat) DH96/97	-	-	-	-	-	280.00 kilos

Table 2: The Stratigraphic Presence of Slag in the South Hill Excavations, 1976

Square	Area	Stratum	Weight (kgs)	Furnace Linings	Slag Type 1	Slag Type 2*	Slag Type 4	Comments
DF78	1	2	.5	-	-	3	-	
DF78	1	2 Lot 1	.2	-	1	2	-	
DF78	5	1	1.3	5	4	4/w	-	Slag Type 4 hammerstone present
DF78	5	2	.1	-	7	5	-	
DF79	-	1 Lot 1	.2	-	-	7	-	
DF88	1	2	2.6	2	3	18	-	
DF88	1	3	1.4	2	10	8	2bg	
DF88	5	3	6.5	106	77	56	12bg	
DF88	5	4	11.69	155	136	64	5bw/6bg	
DF89	surface	-	-	2	-	2	-	
DF89	E	2	.1	1	2	3	-	
DF89	NW	1	.6	2	3	4	-	
DF89	NW	2-3	-	-	1	1	3bg	
DF89	NW	4	.95	1	8	4	-	
DF89	NW	8 Lot 5	1.7	2	2	9	-	
DF89	0	2	.1 plus	-	4	-	-	
DF89	1	-	1.0	3	3	-	1bw	
DF89	1 SE	3	3.5	18	-	7	1bw	
DF89	2a	2-3	4.5	74	12	15	18bw/6bg	Slag Type 4 core present
DF89	3	3	10.75	74	91	59	35bw/2bg	Slag Type 4 core present
DF89	3	3 lower	1.5 plus	15	16	20	3bw/14bg	
DF89	3	4	4.9 plus	36	58	40	13bg	earliest slag stratigraphically; hematite present
DF89	3	2-5	-	44	40	105	11bw	
DF89	6	-	1.0	3	11	14	2bg	
DF89	10	-	.1	1	2	3	-	
DG80	W	1	1.35	14	15	18	-	

KEY: bg - Black, glassy slag

bw - Black, glassy slag with white inclusions

* - Slag Type 3 omitted as it was far less obvious in excavated slags. (See note 5)



Fig. 1: Type 2 slag (c.1 kilogram) found on survey near The Twins. Lower surface (near thumb) has settled copper deposit.

- 2.) This is a type of slag stone-like in density and hardness, distinctly heavy, which perhaps cooled slowly, exposed to the air only on its upper surface. At times soil impressions mark the bottom of the slag, while its upper surface is porous and sharp-edged. The constituents of the slag appear to have been allowed time to settle according to their various weights as often the residual copper rests near the bottom surface, as do the pieces of white inclusions (quartz?)⁴ when they are present. This slag is often magnetic (fig. 1).
- 3.) This slag type is generally the same as Type 2 and is distinguished by stains of iron oxidation. Copper patina may also be present from time to time⁵. It is often magnetic.
- 4.) This slag type is quite distinct in its glassy appearance. It is much like obsidian, only heavier, and its fractures are very sharp. Often it contains the same white inclusions as seen in Type 2.

Preliminary study suggests that some of the Hesār slag from The Twins area may be furnace slag, i.e., slag produced in the furnace and not tapped off. This suggestion is supported by a number of these pieces which have arc-shaped side profiles as if the slag had cooled in position against the sides of a circular furnace bottom (fig. 2). Arc-shaped pieces are known also from the strata of the South Hill excavations.

The slag collected at The Twins lent itself well to being typed whereas that from DH96/97, on the Painted Pottery Flat, was impossible to sort into any obvious types. The slag from this area was quite distinct from that of The Twins in that the pieces were larger, more numerous, and much cleaner (i.e., less charcoal adhering the slag). Even the grey color of this slag did not seem to compare to the blacker color of The Twin's slag. Most of this DH96/97 slag was heavy, dense, and very hard, and iron oxidation was apparent on the surface. The distribution of the slag was different also.

This concentration was not much larger than the 10x10 meter square measured out to encompass it. Slag scatter diminished rapidly beyond this square's borders. It has been suggested that this concentration could represent a later, perhaps Medieval, smelting operation of short duration, (G. Weisgerber: personal communication).

Some of the slag collected from both survey and excavation was found to be magnetic. This magnetism is attributable to the iron content of the slag and this in turn may stem from two potential sources. One source could be the intentional addition into the furnace of oxide ores of iron, such as hematite (Fe_2O_3), or magnetite ($\text{Fe} \cdot \text{Fe}_2\text{O}_4$), which act as a flux during the smelting operation⁶. The flux facilitates the removal off siliceous gangue, the unwanted residue which separates off from the ore during the smelting process. Another potential source for the iron is the sulfide ores of copper, such as chalcopyrite ($\text{Cu} \cdot \text{Fe} \cdot \text{S}_2$), which because

⁴ Dr. Gerd Weisgerber of the Deutsches Bergbau Museum in Bochum, Germany, who has recently conducted archaeo-metallurgical research at Timna in the Negev, reported to us on his visit to Hesār that at Timna quartz was crushed and added to the copper-smelting furnaces.

⁵ The presence of iron oxidation and copper patina on the various pieces of slag is due to prolonged exposure on the mound's surface. Both colorations are far less obvious on the slag taken from excavation; hence the lack of slag Type 3 in the typology of the slag excavated from South Hill.

⁶ In smelting operations involving either copper or lead and the use of iron oxide as a flux, if too much charcoal and an excessive air blast are used, then the furnace is over-driven and a high reducing atmosphere results which may in turn result in the smelting of iron. Thus from such experiences with both copper and lead smelting, ancient smiths during the Bronze Age quite probably had some knowledge of metallic iron. For discussions relevant to this question of the relationship of iron to both copper and lead metallurgy see Wertine 1964; 1968; 1973; Cooke and Aschenbrenner 1975; Rothenberg and Tylecote 1976; Cooke and Aschenbrenner 1976.

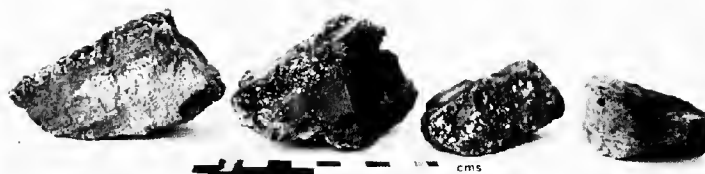


Fig. 2: Slags from surface survey showing arc-shaped profiles.

of their natural iron content may contribute some amount of this element to the slag. Sulfide ores usually require «roasting», a process of heating the ore to a high enough temperature to drive off the unwanted sulfur. Otherwise, the ores will not smelt properly. One wonders if and when ancient miners providing ore for Hesār learned to exploit the usually deep-lying sulfide zone of copper-bearing ores and in turn to roast them⁷.

The stratigraphically excavated slag from South Hill is of particular interest. First, it offers a basis for comparison between the excavated slag and that collected from the surface survey, which should indicate whether or not the slag scatter on the surface of the mound is the same type of slag as that derived from Bronze Age contexts. Second, in the opinion of the excavator, Maurizio Tosi, the slag found in strata (3) and (4) of DF88 area / 5/ and DF89 area / 3/ (Table 2) is possibly part of a clumping area where scoria from a smelting installation was discarded. The smelting furnaces would have existed close to the dump.

From the South Hill excavations a unique example of the use of slag as a by-product of the smelting operation has come to light. During slag sorting it was noticed that one or two black, glassy slag nodules appeared to have had blades struck from them in a systematic pattern (see fig. 3). Grazia Bulgarelli confirmed that these nodules had been used as cores in the production of blades. One slag blade was discovered on the surface and in all, three worked nodules were excavated. One nodule may have been used as a hammerstone after its blade producing capabilities were exhausted. The use of glassy slag as a raw material in the production of blades may have come as a consequence of the practice of crushing slag to extract copper prills from it. The conchoidal fracture of this glassy slag would have been readily apparent. Such slag blades offered a cutting edge superior to those on the more common chipped-stone blades found at Hesār in such profusion.

A second unique use of slag as a by-product has been found in the ceramics of Hesār. Finely crushed slag occurs as temper in a particular type of pottery. In fact, a few sherds of this medium-coarse, buff-orange ware even contained copper prills. Accounting for the occurrence of this slag temper is not easily done. However, a common practice among copper-producing peoples was to extract residual copper prills by breaking up the slag, thus producing a material for possible use as a temper in ceramics. The process of crushing slag

⁷ The location of sulfide ores in a «zone of secondary enrichment» has been aptly defined as follows: «*Secondary enrichment of ore deposits*: The outcrop of a metal-bearing lode is weathered into a deposit known as a *gossan*. The gossan contains oxy-salts (i.e. oxidized minerals of the metal) whereas the original metal ores at depth are usually sulphides. In the gossan many of the soluble substances are leached down and a concentrated residual deposit of metal oxides, carbonates, and sometimes native metal, is left. The downward leaching of metal salts produced in the gossan can sometimes result in a considerable concentration of rich metal ores in an intermediate *zone of secondary enrichment* between the gossan cap and the original mineral vein» (Rosenfeld 1965:131). See also Rosenfeld's Figure 27, a diagrammatic section across a copper lode (*Ibid.*:134).

«Gossans», as defined elsewhere in the *Dictionary of Geological Terms*, commonly consist of a «yellow to reddish deposit of hydrated oxides of iron... A visible guide to potential sulfide ore deposits at depth (1976:190).» The ores of hematite, magnetite and limonite, frequently used as pigments in ancient times, often may be found occurring in gossan deposits. Limonite, for example, is a «field term» denoting «a group of brown, amorphous, naturally-occurring ferric oxides (*Ibid.*: 225)». Though it can include the minerals goethite, hematite, and lepidocrocite, limonite is usually impure goethite FeO(OH) (*Ibid.*: 189).

Schmidt notes the presence of a piece of hematite in his period I and suggests it may have been used as pigment or as a hammerstone (1937:59, Pl. XVIII). In the analysis of metallic objects he included a piece of magnetite (56% iron oxide) from Hesār IIC square DG15. The 1976 excavations at South Hill produced only hematite *in situ* among what is probably the earliest excavated slag from Hesār. During this same season the surface of the mound produced a few samples of hematite, magnetite, and what appeared to be limonite *in situ* in one of Schmidt's excavated squares on the Painted Pottery Flat.



Fig. 3: Black, glassy slag core with parallel flake scars, from South Hill excavations DF89 /3/ (2-3).

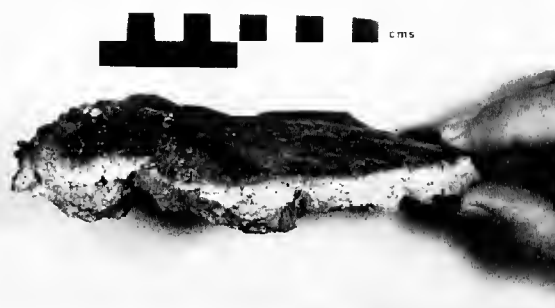


Fig. 4: Ceramic smelting furnace lining fragment from South Hill excavations DF88 /5/ (3) showing dark, vitrified furnace interior surface.

may be recognizable archaeologically in work areas with floor *débitage* and tools requisite to slag-crushing.

The fragments of furnace linings found with the slag are important in that they are not a common find even at sites which have established metallurgical activity and they provide excellent evidence that actual smelting was occurring at Hesār. Furthermore, they are a very desirable sample for the laboratory as they can yield evidence of smelting duration and temperatures (Kingery and Gourdin 1976) and absolute dates via thermo-luminescence (S. Fleming: personal communication). The linings from Hesār consist of a coarse, chaff-tempered ceramic from the furnace interior that is highly vitrified on one side (fig. 4). Whether this material was originally spread over stones forming the furnace chimney and bottom has not been established. The rather fragile furnace linings found on survey were broken into a number of pieces due to exposure. Larger fragments discovered in excavations at South Hill, in what may well be a scoria dump, suggest that smelting furnaces were broken open to extract the cooled copper ingot from the furnace bottom.

Prior to the 1976 excavations at Tappeh Hesār, three different sets of analyses had been done on certain mineral and metal samples from the site. The first set, done under Schmidt's auspices, included those aimed at determining the tin content of Hissar copper artifacts to ascertain whether or not the use of the term «Bronze Age» was merited. These analyses done by Mr. W.C. McNeill and Mr. Brainard of the American College in Tehran unfortunately received only brief mention in the 1933 report. The presence of tin was recorded as increasing from period I to period III (Schmidt 1933:355). The second set of analyses, also done at Schmidt's request, by Dr. L.C. Reisch and Mr. D. Horton, was more artifact specific when reported. The artifacts analyzed, eleven in number, consisted of: 2 pins from IB, 2 pin/nails, one pin and one band from IC, one disk from IIA, a band and a ring/bracelet from IIIA, a ring/bracelet from IIIB and 2 ring/bracelets from IIIC. Also from IIIC came a ring/bracelet fragment of silver, a band fragment identified as bornite (Cu_5FeS_4) a sulfide ore of copper, a lump of magnetite iron ore and a fragment of lead (Schmidt 1937:359-360). The analyses of the

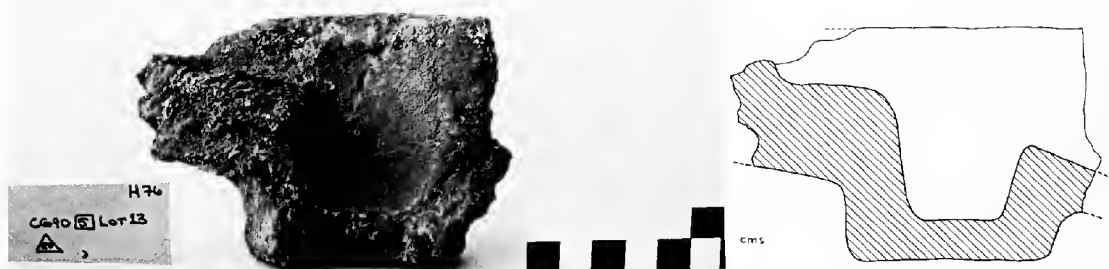


Fig. 5: Ceramic shaft-hole axe mold top view. From Main Mound excavations CG90 /3/ Lot 13/20: a, interior view; b, exterior view; c, top view; d-e, sections; f, top view.



Fig. 6: Ceramic shaft-hole axe mold, exterior view.

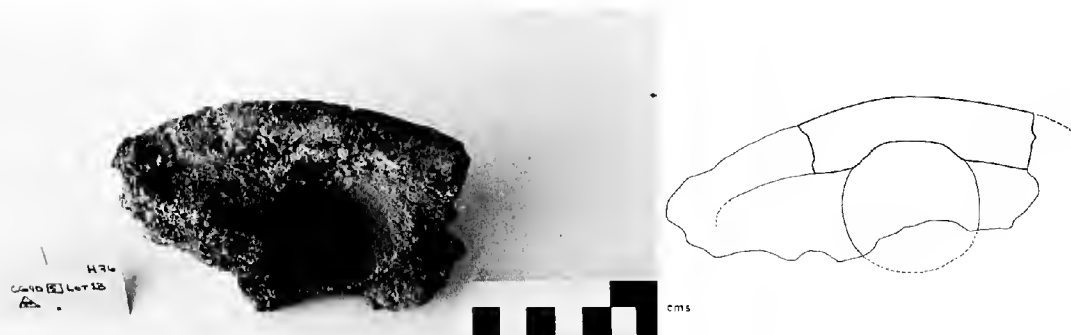


Fig. 7: Ceramic shaft-hole axe mold, top view.

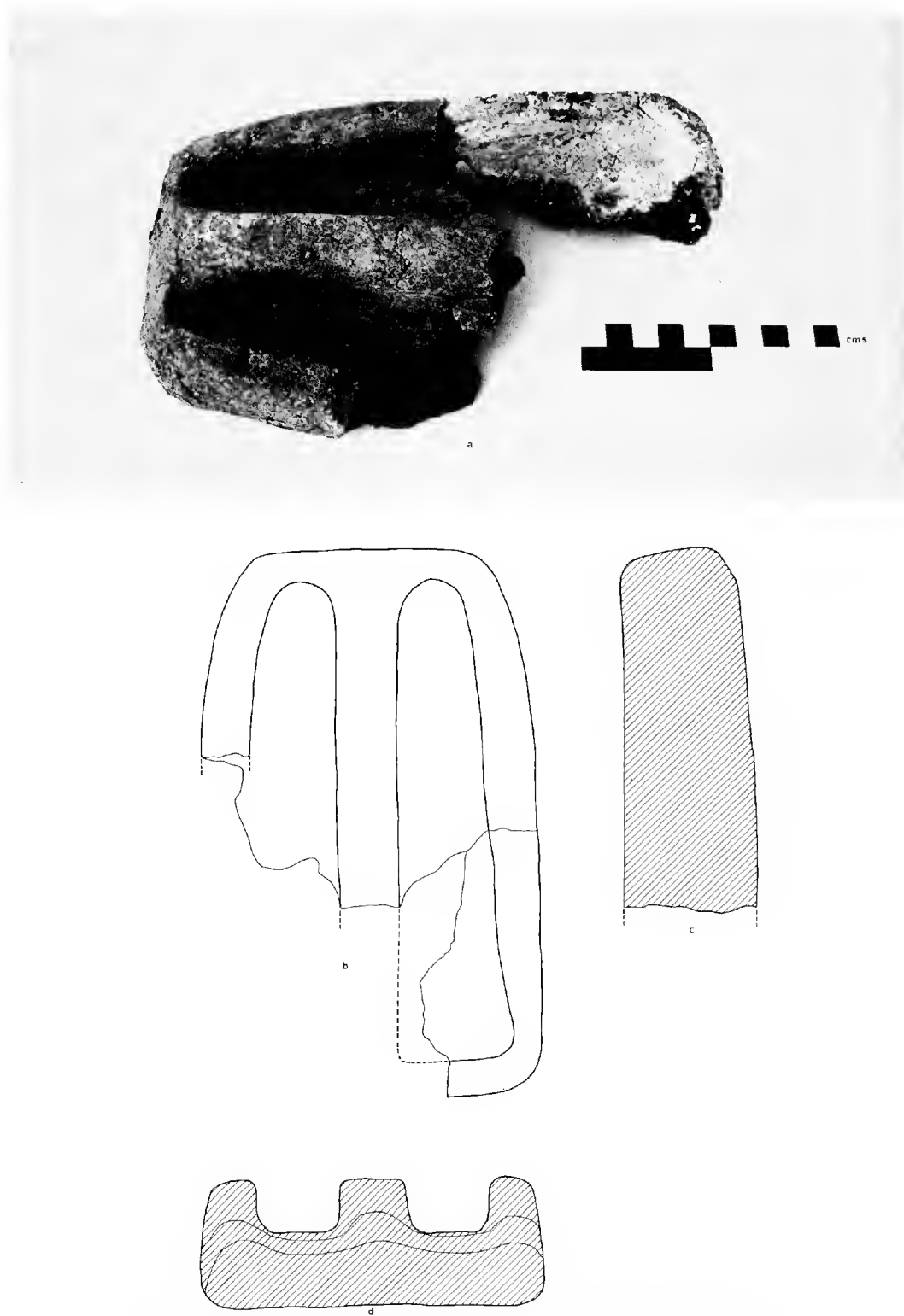


Fig. 8: Ceramic double channel mold from South Hill excavations DF88 / 5/(2)/1: a-b, top view; c-d, sections.

copper artifacts show 7 of them having from 0.78% to 2.24% tin content, suggestive of an intentional alloying of copper with tin.

2.24% tin content, suggestive of an intentional alloying of copper with tin.

The third set of analyses (unpublished at present) of copper artifacts was carried out in 1962 by Dr. Ufuk Esin at the Württembergisches Landesmuseum, Stuttgart, Germany. Two hundred three copper artifacts out of a total of 1109 from Hesar were analyzed by emission spectroscopy⁸:

Hissar I: 3 pins, axe, chisel, dagger, blade

Hissar IA-B: punch

Hissar IB: 6 pins, 2 dagger blades, punch

Hissar IC: 2 dagger blades, pin

Hissar II: 9 bracelets, 4 pins, object handle, chisel, stud, earring, tube, stamp seal

Hissar IIA: dagger blade, awl, nail

Hissar IIB: 20 bracelets, 3 pins, wand, rings

Hissar III: 17 bracelets, 7 chisels, 4 spear points, 3 wands, 3 pins, 3 ornaments, 3 vessel fragments, 2 stamp seals, 2 tubes, 2 awls, 2 arrow points, 2 earrings, mace, belt hook, axe, diadem, mirror, human figurine, trident

Hissar IIIB: 20 bracelets, 5 anklets, 2 pins, 2 tubes, diadem, belt, mace, chisel, «armband», axe, wand, awl, ingot fragment, dagger blade, mattock, ring

Hissar IIIC: 6 human figurines, 4 spear points, 3 wands, 2 awls, ornament, spindle, pins, nail, earring, anklet, animal figurine, stamp seal, vessel fragment, ring fragments, chisel, shaft-hole axe.

Tin is present only in minute unmeasured traces in a number of artifacts among the 203 artifacts analyzed in this third study. Only 7 of the objects show measureable traces of tin and of these 7 only 2 have more than 1% tin (H-3245 spearpoint 3.6%Sn; H-430 belt hook 4.1% Sn). A number of artifacts show arsenic present in significant quantities. The apparent contradiction between these two sets of analyses may be a factor of the different analytical techniques utilized or, the contradiction may be a technological difference of chronological significance and thereby be resolvable on stratigraphic grounds. The revised sequence at Hesar should allow us to place in proper chronological perspective the metal artifacts and the associated technology from Schmidt's early excavations, especially important because they constitute the main corpus of metal artifacts from the site.

The probability of achieving such an understanding of Bronze Age metallurgical technology at Hesar is greatly enhanced by the fact that excavations in 1931-1932, and especially those in 1976, have revealed a small but important collection of artifacts directly associated with metals smelting and casting. On the Main Mound in square CG 90/5/, in an outdoor area among buildings, a fragmentary shaft-hole axe mold (H76-N27) was found (see Part VI and fig. 22). This mold is almost identical to that which Schmidt excavated during 1931-1932 from CH85 «Hissar IIIB refuse» (1937:185, Pl. XLIV, H 3577). In addition to



Fig. 9: Copper ingot from North Flat excavations CF38 /4/.

this one very important mold fragment, several other mold fragments were found at South Hill (cf. Pigott, Howard, Epstein 1982) (see fig. 8). On the North Flat from Room 4 in the Burned Building, a portion of a copper ingot (H76-S4) was excavated in 1976, surrounded by some evidence of burning (fig. 9). Schmidt reports a CF37 (which may also be a Burned Building context) Hissar III fragmentary disc of copper, part of a copper ingot, which shows stains of iron oxidation (as does the 1976 ingot fragment). He observes, «It may be exactly such a phenomenon that brought about the discovery of work in iron (1937:208, Pl. XLIV, H225b). There is then consistency in the types of metallurgical artifacts uncovered by both expeditions to Hesar. This distribution of metallurgical artifacts would suggest that metals production at Hesar was a widespread, commonplace activity going on in and among occupied areas of the site.

It is assumed that Hesar / Dāmghān was an important way-station along the Great Xorāsān Road due to its

⁸ The initial results of the program of analyses of Hesar metallurgical materials underway at the University of Pennsylvania (MASCA) were presented recently at a conference on «Early Pyrotechnology» held March 19-20, 1979 jointly sponsored by the Smithsonian Institution and the National Bureau of Standards. The paper, authored by Vincent C. Pigott, Susan M. Howard and Stephen M. Epstein, was entitled «Culture Change at Bronze Age Tepe Hissar (Iran): The Pyrotechnological Evidence.» The paper has now appeared under the title «Pyrotechnology and Culture Change at Bronze Age Tepe Hissar (Iran)», T.A. Wertheim and S.F. Wertheim (eds.) *Early Pyrotechnology: The Evolution of the First Fire-Using Industries*, pp. 215-236, Washington D.C.: Smithsonian Institution Press, 1982.

location on the portion which ran east-west through northeastern Iran. Location on this major trade route, thought to have had goods of all kinds (metal perhaps?) moving both east and west since at least the Bronze Age, would have been critical to the economic well-being of a settlement such as Hesār. It is possible that the slag scatter which covers the site is a vestige of the industrialized production of metals which might well have been traded along the Great Xorāsān Road.

Of prime importance in this regard is Hesār's proximity to abundant ore deposits, a fact which may make it possible to discern the relationship between a center of production and the sources from which it drew raw materials. Both central deserts of Iran, the northern Dašt-e Kavir and the southern Dašt-e Lut, contain a number of major ore deposits, (Wertine 1968:929). At the northern edge of the Dašt-e Kavir, the Dāmghān region itself is surrounded by ore deposits (Taghizadeh and Mallakpour 1976; Bazin and Hübner 1969: map). For example, a major metallic ore district is found 150 kilometers to the east of Dāmghān, centered around the town of Abbasabad. This district has a number of copper deposits which are presently being mined. Copper along with lead/zinc deposits are found 100 kilometers to the south of Dāmghān. Additional lead/zinc deposits lie between Dāmghān and Semnan. These ore sources are those documented by the Geological Survey of Iran. Minor deposits, not of major importance now, but potentially exploitable in Bronze Age times, may lie closer to Hesār. All of the known deposits are close enough to Hesār that animal caravans could have transported ores directly to Hesār. Therefore, there would have been no need to smelt the ores at the mines to facilitate the transportation of metals in ingot form. The stock-piling of ores could have been possible, thus allowing smelting to take place whenever a supply of metal was required⁹.

The large-scale metallurgical activity at Hesār raises a final question: What types of fuels were used to fire the furnaces?¹⁰ In the Turan Biosphere Reserve some 200 kms. to the south-east of Hesār, recently studied by a team headed by Dr. Brian Spooner of the University of Pennsylvania, at least 40 slag heaps of unknown date and type have been located (1977). Until ten years ago the production of charcoal was a successful enterprise in the Turan area. The antiquity of charcoal production is not known, but the possibility exists that it may have played a part in the deforestation and ultimate desertification of regions in Turan. It is logical, therefore, to consider the extent to which the exploitation of local vegetation for extensive, long-term smelting may have affected the regional ecology of the Hesār / Dāmghān area.

In conclusion, the excavations conducted at Tappeh Hesār in 1932-1933 produced a remarkable collection of metal artifacts, particularly in copper, but also some

in lead, silver, and gold. These artifacts alone merit a study of the metallurgical traditions which produced them.

Hesār has also yielded artifacts of a different sort but of equal importance namely the slag, furnace linings, and other scoria of metals production. Much of this latter material comes from well-stratified contexts within the site and should, among other things, permit us to understand something about the technology by which it was produced. It may well have been that the production of metals beyond the quantity required by the population of Hesār was, in some part, stimulated by the location of the site along a major trade route. The site is surrounded by sources of the ores which must have been used at the site by Bronze Age smiths. From a number of indications such as metallurgical scoria, finished metal artifacts, and the availability of ores, Hesār would seem to have been a center of metals production of some magnitude.

A systematic program of analysis of the metal artifacts and the scoria from Hesār has been initiated at the University of Pennsylvania. The results of this program compliment those of the analyses previously done. The significance of the emission spectroscopy analysis of the copper artifacts has been assessed and further study of the results has resolved the arsenic content issue. Our program of analysis includes also the study of the structure and composition of the slag types and furnace linings utilizing techniques such as petrography, «wet» chemical analysis, emission spectroscopy, electron probe, and X-ray diffraction (Pigott, Howard, Epstein 1982). These techniques have provided insights into the process and constituents involved in smelting operations at Bronze Age Hesār. The stratified materials were of importance here, as they demonstrated variation over time in the metallurgical technologies employed.

A final direction to be taken in the study of archaeo-metallurgy at Hesār will concern the function of the metals industry within society at ancient Hesār. Metals and metal-related artifacts will be evaluated in terms of their locations and associations in order to determine the economic and social significance of copper and related metallurgies. One hopes that a comprehensive investigation of the metals industry from both an analytical and an anthropological point of view may ultimately improve our understanding of the relationship between ancient technology and culture.

⁹ An archaeo-metallurgical survey of the mineralized zone around the Dāmghān area is needed. Reports of «old workings» in and around the modern mines mentioned are frequent in the Geological Survey reports (Bazin and Hübner 1969). Some evidence of the ancient exploitation of these ore bodies must still remain and should be recorded.

¹⁰ See Wertine 1968:927-929.

V. THE STRATIGRAPHIC SEQUENCE OF SQUARES DF 88/89 ON SOUTH HILL, TAPPEH HESĀR

Maurizio Tosi and G.M. Bulgarelli

The 1976 surface survey had identified *South Hill* as a multifunctional activity area (Part III), i.e., the only section at Tappeh Hesār where all types of manufacturing debris clustered within a relatively small area (ca. 3000 m²). Examination of the local stratigraphy offered the possibility of reconstructing the diachronic order of the various activities as separate entities related to a structural sequence. The dating of this sequence and its relative synchronism with other parts of the site will be dealt with at a later date in terms of a general revision of the Hesār sequence based on stratigraphic excavation, radiocarbon determinations, and a network or reliable cultural and formal correlations with other newly-excavated sites on the Iranian plateau.

With the exception of the limestone/soapstone manufacturing activities, it has proved possible to determine the sequential order of all of the activities carried out on *South Hill* as indicated by the surface survey. Work in 1976 was restricted to some of the sectors exposed in Schmidt's squares and very little was excavated below the lowermost level reached during the 1932 campaign (Schmidt 1937: figs. 21, 61, 83, pp. 106, 107).

Excavations at *South Hill* started on September 29th 1976 and lasted four weeks, until October 26th, with an average labor force of six men. The excavations were centered on DF89 because this square had the highest density of lapis lazuli chips and related flint *débitage* and the dating of this activity was of paramount interest (pl. V). In order to correlate the stratified evidence for the activity areas already identified an extended stratigraphic tracing effort was needed. A layer of gray ash and lapis debris 9c located undisturbed in the north-south section between DF89 and DG80 (see below) could not be linked with any significant structure in close proximity (pl. IV). On the other hand, a greater part of the architectural remains exposed by Schmidt in this area were still standing a few meters away within the western half of DF89 and adjoining squares DF88, DF78 and DF79 (Schmidt 1937: figs. 62, 63). Thus, to ensure a reliable stratigraphic correlation between the well-preserved structural complex to the west and the thin-layered lapis lazuli dump of DF89/DG80 to the east it was necessary to tie them together through a combination of sections drawn from newly scraped faces in DF89 (fig. 1, pl. VI). After forty-four years the state of preservation of the exposed walls and floors was quite remarkable. Almost all features reported on the original plan (Schmidt 1937: fig. 62) were still standing and could be remeasured.

Results from the 1931-32 Excavations

Schmidt recognized in this area two main building horizons. The earlier one, exposed in squares DF78/79/88 and DF89, was assigned to period IIB as indicated by black walls (Schmidt 1937: fig. 63) superimposed on the original, more carefully drawn architect's plan (*ibid.*: fig. 62). In Schmidt's opinion this level consisted of a group of domestic buildings generally oriented northwest-southeast which he described as «constructed in a haphazard manner» (1937: 106). The greatest exposure of a single structure was that of a rectangular house (rooms 10-13 on Schmidt's plan) in DF78/79 with unevenly spaced buttresses along the west face of its exterior wall (a feature characteristic of period II houses, see Part VII, p. 85). The house plan was arranged around three sides of an almost square «kitchen» or central room (Schmidt) or «courtyard» which was about 21 m² in area. A door shielded by a short screening wall entered from the northwest while a second entrance with square pilasters (?) opened through the south wall from room 13 (pl. V). The plan bears comparison with other structures from the site assigned to the same period.

The total size of this building was around 100 m², a dimension that, together with the typology of its plan (assuming a central courtyard rather than room), is reminiscent of the private houses excavated at Sahr-e Sūxtch in the *East Residential Area* and dated to phases 6 and 5 of period II at that site (i.e., ca. 2700-2500 B.C.; Tosi 1969: 293-300, figs. 10-15).

Apart from this «buttressed house», Schmidt identified three other buildings on *South Hill* (his rooms 2-5; 6-8 and 9 and 14; and 15-18 in DG60/DG61) which he assumed were related to the same period (1937: fig. 62, p. 106). Later structures were scattered all over the hill, mostly resting on top or inside of the better preserved period IIB buildings (*ibid.*: fig. 63, indicated in white). A few isolated walls associated with an earlier horizon, presumably IIA, were found in DF89 (*ibid.*: fig. 63, indicated by horizontal hatching).

Schmidt's excavations on *South Hill* extended to the northeast and included squares DG 70, DG 60, DG 61 and DG 51. They were located on the higher part of the mound and included later structures in a poor state of preservation which he dated to period IIIA (*ibid.*: fig. 63). In this area (DG 61) a second architectural compound with a central square room, 15, similar in plan to the «buttressed house» of DF78/79 was excavated below the period III remains. This central room, or «courtyard», had a

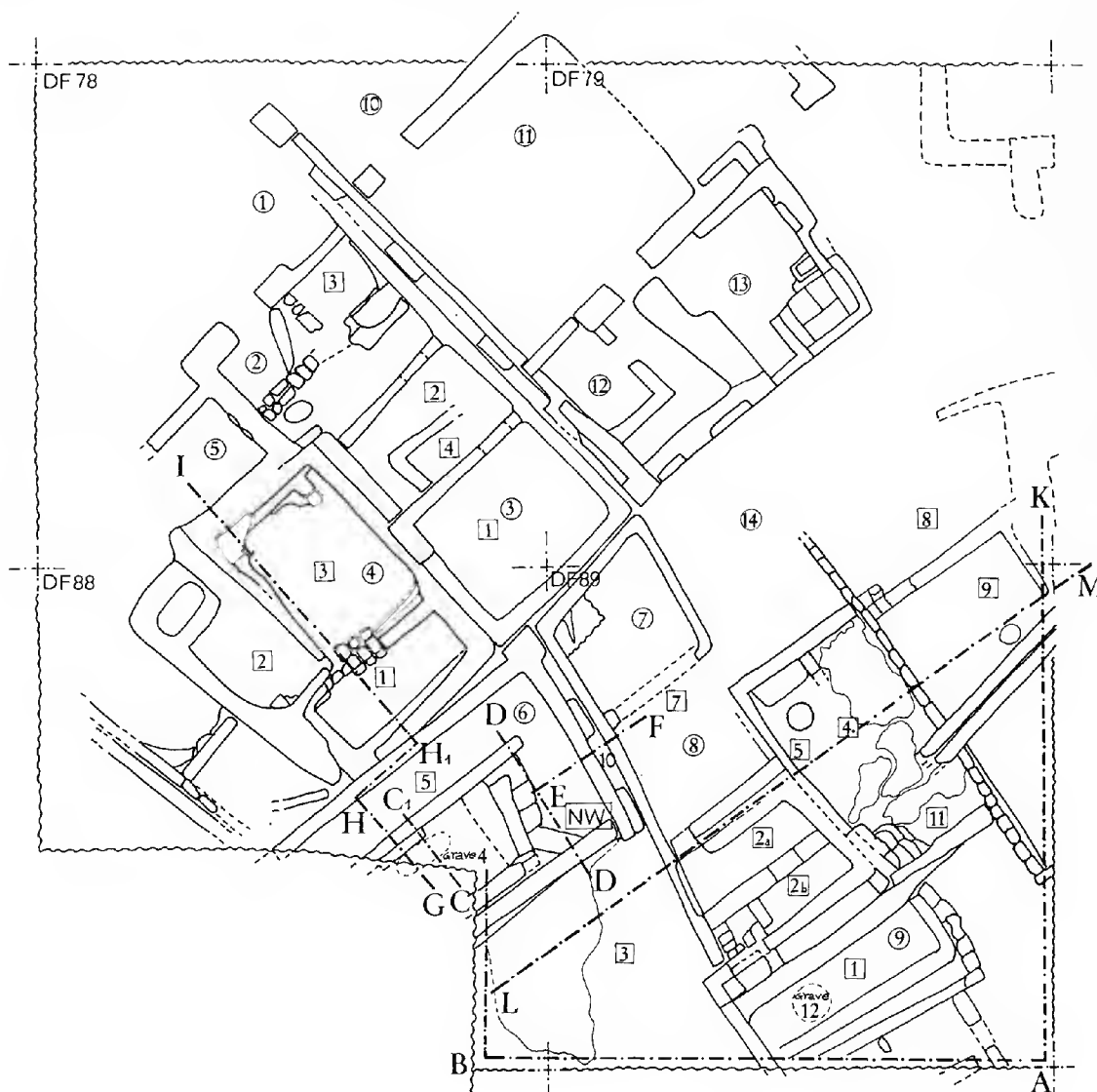


Fig. 1. Tappeh Hesār. Position of sections in excavated areas in sq. DF/ DG. See Pl. VI.

square raised bench-fireplace and is also strongly reminiscent of Sahr-e Süxtch II and Mundigak III-IV architecture (Tosi 1969: 305).

During periods of abandonment the whole area was used as a burial ground with graves dug everywhere. Pit disturbances are most evident in the IIB structures. The graves were found clustered in DF78/88, and in the southwest corners of both DG60 and DG70 (Schmidt 1937: fig. 62).

Since Schmidt's sequence was primarily established from the morphological variance of funerary offerings,

it is likely that these graves were important to his chronological determinations. Within the 350 m² area of DF78/79/88/89, he excavated a total of seventy-eight burials whose original record sheets are stored in the University Museum archives. Fifty-five of the graves, or approximately 70%, he dated to late period II/ early period III. Later he changed the record sheets in several instances from late II to IIB and from early III to IIIA. The rest of the graves he assumed belonged either to period II (14) or period III (1) or IIIA (6). Schmidt shows his uncertainty about these determinations on

the burial sheets by the inclusion often of a question mark or the word « prob ».

Based on his description and definition of the area, the sequence of *South Hill* would have been made of five cultural horizons seriated from the top down in the following order:

horizon 0: post-IIIA grave horizon.

horizon 1: IIB building horizon; greatly eroded by aeolic deflation.

horizon 2: late II-early III grave horizon (main burial area).

horizon 3: IIB building horizon (« buttressed house »).

horizon 4: IIA (?) noted only as « present » in DF89 in Schmidt's fig. 21 but not discussed.

According to this sequence the pottery kilns identified in 1976 at DF88 and DF78 would date to the period III occupational horizon above, while the lapis lazuli, metal and limestone « dumps » fall within the IIB occupation or horizon 3. It is remarkable that, notwithstanding the large number and the different kinds of industrial debris which his workers must have been encountering during the excavation of DF89, Schmidt reported very few objects from the area. Among them was a red-brown/dark-gray terracotta open-face mould, H 1727, with three parallel grooves along the longer axis, dated to IIB (1937: 185; pl. XLIV). This mould must have been used for the casting of metal rods or « wands ». Yet no association was made between this object and the copper slag being found in the fill of *South Hill* as the latter apparently were not regarded as significant cultural remnants.

Miscellaneous objects from the DF78/79/88/89 area reported by Schmidt (1937) include:

DF78	H 1705 Biconical clay weight
	H 1694 Clay figurine (moufflon?)
	H 1722 Stone pestle (hematite?)
	H 2250 Flint core
DF79	H 2647 Bitumen disk bead
	H 2578 Circular stamp seal
DF88	H 2035 Flint denticulated blade
	H 2582 Circular stamp seal
	H 2622 Round clay lid
DF89	H 1727 Pottery mould
	H 1728 Circular stamp seal
	H 1729 Clay whorl
	H 1746 Spool-shaped clay object
	H 1785 Circular stamp seal

Results from the 1976 Excavations

The major aims of the 1976 excavations on *South Hill* were two: first, to detail the internal divisions of Schmidt's sequence for the structural remains of his IIB period and, second, to correlate the activity areas visible on the surface to this refined sequence.

A great part of the work consisted in cleaning the walls still standing and removing the rubble that had accumulated since 1932. The run-off from the 1932 unexcavated balks had deposited a fine-grained clay sediment, ca. 5 cm. thick, in shallow areas such as DF89 //1. Once this sediment had been removed it



Fig. 2. Tappeh Hesār. View from south of area DF89 NW lot 5, showing test trench below staircase structure.

was possible to locate not only the walls and the surviving portions of the floors exposed by Schmidt, but also a few pockets of the original deposit which had been left untouched. These pockets proved extremely useful in reconstructing the original extent of the lapis lazuli dump. By cleaning DF89 an almost uninterrupted floor was uncovered which represented

p. 185; Pl. XLIV; period III
p. 118; Pl. XXVIII; period II
p. 122; Pl. XXXI; period II
p. 220; Pl. LXIII; period IIIC
p. 232; Pl. LXX; period IIIA
p. 201; Pl. XLIX; period IIIA
p. 219; Pl. LXIII; period III
p. 201; Pl. XLIV; period IIIA
p. 117; Pl. XXVIIA; period III
p. 185; Pl. XLIV; period IIIB
p. 118; Pl. XXVIII; period IIA
p. 117; Pl. XXVIIA; period IIA
p. 117; Pl. XXVIII; period IIA
p. 118; Pl. XXVIII; period IIA

the bottom of Schmidt's excavation and which could be associated with the floor at the bottom of section DF89/DG80 (pl. IV). Schmidt had removed the gray ash layer with the lapis lazuli chips leaving behind the floor on which the ash layer had been deposited. This floor represented a terminus *ante quem non* for the lapis lazuli layer and thus provided a basic link between the industrial waste deposit and the structural sequence.

Eight main stratigraphic phases have been identified as a result of the 1976 excavation at *South Hill*, numbered 8 to 1 from the bottom up. Only five of these (8,7,6,5,2) are building levels. The pottery associated with all of these phases is of Schmidt's

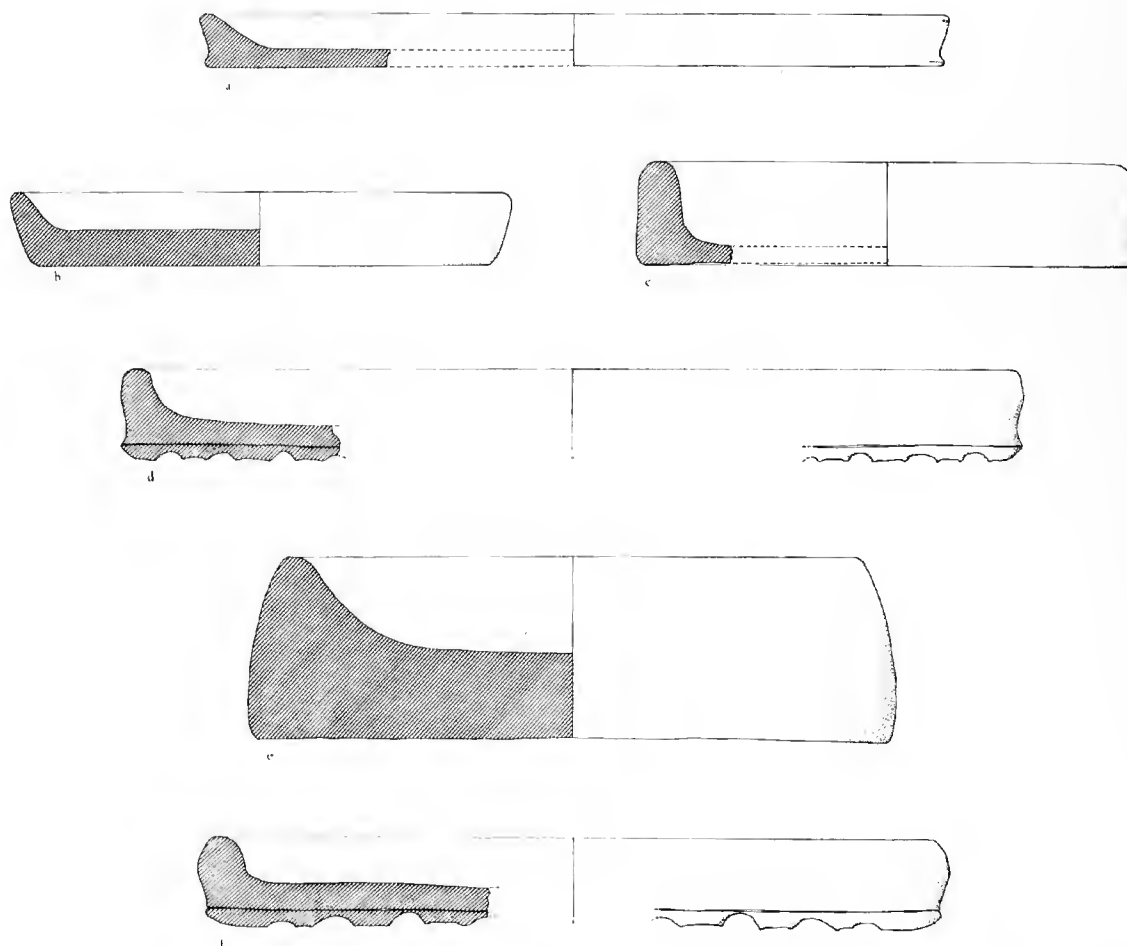


Fig. 3. Tappeh Hesar. Dumps of copper smelting activity area DF88: Pans and casting moulds of chaff-tempered ceramic. Provenance: a, b, e, f from DF 88 / 5/ 3; c from DF88 / 6/; d from DF89 NW lot 5.

period II type. Of the three phases with no architectural remains two are burial episodes (3 and 1) which at present appear in the sequence as disturbances of earlier walls. The third non-architectural phase (phase 4) is the extensive lapis lazuli dump which is sandwiched between two structural horizons in DF89 layer 9a-9c (pl. IV).

Phase 8: DF89 area NW, lot 5

Phase 8 has only been identified in a test excavation made in the floor of the phase 7 stairway structure (DF89 area NW lot 5) (fig. 2). A phase 8 structure is represented by two walls and a floor forming the corner of a room (pl. V). The walls were preserved to a height of 80 cm. and were used as footings for the phase 7 structure above. A door, 45 cm. wide, opened to the south and a third wall was joined beside the western jamb at a 35° angle. The room fill lying on the floor and against the walls of phase 8 consisted of five layers as follows (pl. VI section E-F) :

- ⑧ Several thin layers of greenish silty clay 10 cm. thick.
- ⑦b Bricks from phase 8 wall collapse lying on the green clay.
- ⑦a 50 cm. of loose soil sloping down from north to south and containing few artifacts. This deposit probably marks a period of abandonment and exposure.
- ⑥ A lower layer of fill of loose bricks.
- ⑤ An upper layer of fill consisting of brick fragments, sherds, clay lumps and soil.

The layers of brick fill, ⑤ and ⑥, contained materials representative of phase 8 and are the best source presently available for information on this earliest excavated phase from 1976. Apart from the abundant pottery, these finds include a significant percentage of copper smelting slag clay figurines (fig. 4), half a dozen clay cones (so-called *counters*) (fig. 5c). Among these objects there was also found a clay « tablet » (H 76-122), 5.8 x 4.3 x 3

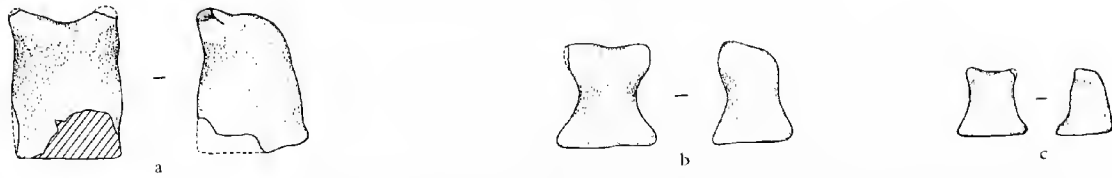


Fig. 4. Tappeh Hesār. Stylized anthropomorphic clay figurines from South Hill excavations: a, DF 89 NW lot 5 7; b, c, DF 88 /5/3.

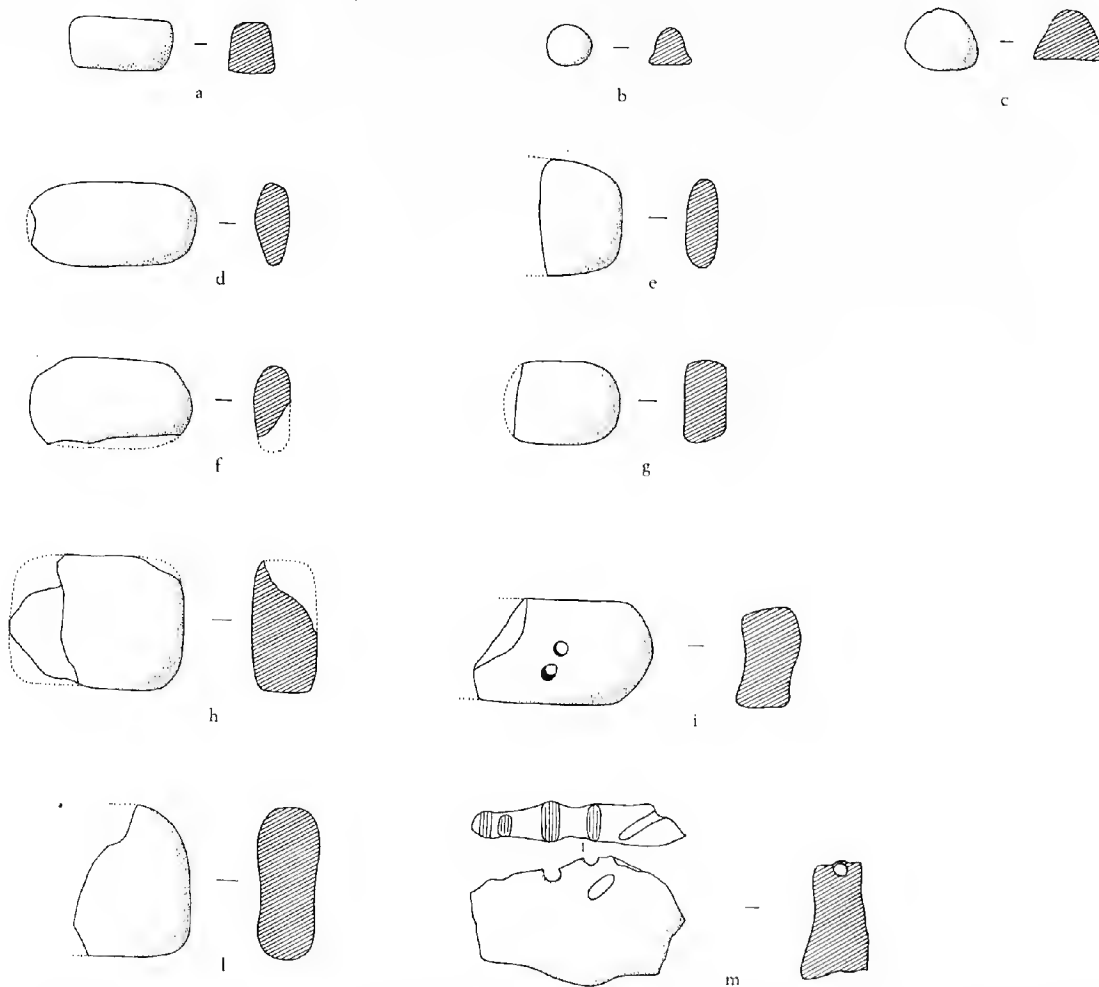


Fig. 5. Tappeh Hesār. Phase 8 clay counters and possible label blanks. Provenance: a, b, d, f, l from DF88 //2-3; c from DF89 NW lot 5; e, i, m from DF 88 /5/3-4.

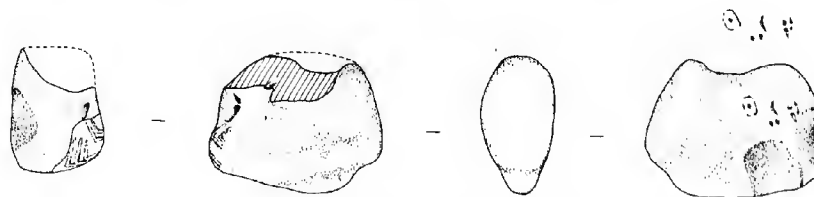


Fig. 6. Tappeh Hesār. Inscribed clay tablet or label from DF89 NW lot 5 6, stratigraphically associated to phase 8. Inv. II 76 - 122.

cm., pierced on top by a longitudinal hole, sealed twice with a stamp seal, and pinched once in the lower right hand corner (fig. 6). The object is inscribed with two signs and a digit (4?) running right-to-left using a very fine point near the long side. Labels, or tags, of this kind have been found in varying quantities on the Iranian plateau in recent years in sites of the proto-Elamite period at the end of the fourth millennium B.C. and later. The eastern most of these discoveries was made at Šahr-e Sūkته, where a similar object, sealed with a cylinder but bearing no signs, was found in XVD 9 in a cultural assemblage from period I dated to the very beginning of the third millennium B.C. (Amiet and Tosi 1977: 15). The signs on the Hesār label are unusual and do not reproduce known proto-Elamite signs. Radiocarbon dating and future work on the associated pottery will permit the dating of this find more precisely at which time its significance to other occurrences of similar objects in protohistoric Iran can be assessed.

The combined presence of copper-smelting slag, devices for keeping accounts in an early administrative system (such as the small conical or pyramidal *counters*; Oppenheim 1958; Amiet 1966; Lambert 1966; Schmandt-Besserat 1974), and the clay label/tablet are indications of the growth of administrative organization associated with the specialized craft labor at Hesār at the beginning of period II.

Phase 7: the Buttressed Stairway Structure of DF88

In phase 7 a buttressed stairway was built immediately over the phase 8 remains with a east-west wall (on the north) and a north-south wall (on the east), following the lines of the phase 8 walls which served as foundations (pl. V). The eastern (outside) face of the north-south wall was buttressed. The top of layer ⑤ of phase 8 had been levelled and a thick clay floor ④, 25-30 cm. thick, laid down (pl. VI: sections C-C₁, D-D₁). Directly on this surface against the northern wall a stairway was built leading up to the west. Along its southern side the stairway was enclosed by an internal wall the south face of which had a number of buttresses which rested directly on top of the clay floor ④. Their weight was carried by bonding tying them into the wall, with the result that there were a series of large cracks in the wall. Parallel to this buttressed wall, further south, was another wall the presence of which created a long corridor (ca. 6 x 4.20 m.) which must have been connected to the central area of a much larger architectural complex lying to the west. The eastern end of the corridor led around the internal buttressed wall and up the stairway in a U-shaped plan. The stairway itself was built with mudbricks laid in courses consisting of from three to four stretchers on each step. The stair was 1.60 m. wide, with the lowermost step being just 1.10 cm. wide and badly worn.

Phase 7: the Dumping Yard in DF89/3/

From the end of phase 8 to the beginning of phase 2, DF 89 /3/, the area immediately south of the buttressed stairway structure of DF 89, was an open space used as a dumping ground. The stratigraphy in this area provides the best sequential order for the

metal-working slag on *South Hill*, with a dense concentration of metal slag in the lower half of the deposit. The sequence is documented in the section drawn along the western and southern sides of DF89 /3/ (pl. VI: section A-B; pl. VII). It is likely that the open area was originally quite large and it may be assumed that there originated the low-density slag seen spread along the southern edge of *South Hill*.

The sequence includes eleven main stratigraphic layers:

- Phase 8: ⑪ Yellow aeolic sand on top the lowermost (pl. VI sections A-B, B-C) floor located.
- ⑩ A thin-layered, 12-14 cm. thick deposit, rich in metal slag and copper prills, with interspaced lenses of charcoal, soil and dung.
- Phase 7: ⑨ A 60 cm. thick mud-brick fill against the plastered wall of phase 8 which raised the ground and prepared the foundation surface for the buttressed staircase building.
- ⑧ Thin-layered soil and dung deposits above the mudbrick fill which rest against the top of the ruined phase 8 wall used as a footing for the southern wall of the buttressed stairway structure to the north. The deposits probably originated from people and animals frequenting the yard area on the south side of the buttressed stairway building.
- ⑦ Clay sediment along the southern wall of buttressed stairway building.
- ⑥ A highly carbonized layer of metal slag, 10-20 cm. thick, with recurring lenses of copper prills ⑥a mixed with potsherds and hundreds of fragments of vitrified furnace linings. As pertaining to this context a large basin-shaped furnace element 2 of tempered clay was found in layer ⑥b - ⑥c the southern section, just below the western wall of room 9 (fig. 7).
- ⑤ A thin-layered deposit of red-oxidized dust alternating with brownish soil and charcoal lenses with only a few scattered bits of metal slag.
- Phase 6 (?): ④ A paving of purposefully-laid bricks, about 1.60 m. in length, which marks the end of the earlier episodes of metal-slag dumping.
- Phase 5/6: ③f - ③f A series of parallel soil layers, 45-50 cm. thick, interspaced with charcoal lenses, laid in a shallow pit. Metal slag in increased quantity and associated with evidence of a bead-making workshop, the debris of which was found clustered near the northern edge of the area between ③f and ③h. Thin pockets of small copper prills ③i attest to the fact that metal smelting must have occurred close-by.
- Phase 4: ③c - ③b A series of horizontally-layered thin sediments, 60 cm. thick, which had been mostly removed in 1931-32 when excavations stopped at ③f. Between ③f and



Fig. 7. Tappeh Hesār. Possible element of clay furnace jutting out of section in DF 89 /3/, below the western wall of room 9.

the top of ③a a great quantity of lapis lazuli chips and blue-stained flints was recovered. Layers ③c, ③d, and ③e were thin lenses of charcoal and ash spread evenly throughout the area. Slag is present in a very low percentage.

Phase 2: ② Loose soil layers with numerous sherds, partly topped with scattered bricks ③a. A foundation trench ②b for a north-south wall separates DF89 /3/ from DF89 /1/ and cuts through the top of the thin, horizontal layers of the phase 7-4 dumping ground below.

Phase 7: The DF88 /5/ Sequence

A narrow corridor running from northwest-to-southeast in DF88 /5/, north of the buttressed stairway building of DF88 and west of storeroom DF88 /1/, provided additional stratigraphic evidence for metal working activities. The corridor was formed by parallel walls, 30-35 cm. thick, set 94 cm. apart. Excavation of this area was carried down to the original floor over which lay the following sequence (pl. VI, section G-H).

Phase 7: ⑧ The floor of DF88 /5/ made of pressed clay. The sloping profile probably resulted from the fact that people walked mostly along the southern wall.

⑦ A sequence of parallel, thin layers of gray-black ash and red-oxidized earth, 55-65 cm. thick, in alternate deposition. Very little slag was found. An oblique direction was taken by all the layers which sloped sharply up to the northern wall following the surface of the original floor.

Phase 6: ⑥ A layer of metal slag, 20-25 cm. thick, which included copper prills, furnace lin-



Fig. 8. Tappeh Hesār. Possible clay tablets or label blanks. Provenance: a, c from DF88 /1/ 2; b from DF 88 /5/ 3.

ings, clay pans and open-faced casting molds, all tightly packed together with oxidized clay in small shapeless lumps.

Phase 5: ⑤ A U-shaped ash and charcoal layer, probably accumulated during the phase 5 utilization of areas DF88/1/ and /3/.

④ An artificial fill of brick rubble and sherds.

Phase 4/3: ③ The bottom of Schmidt's trench: hard packed clay of an exposed surface — possibly related to the abandonment of the area at the end of phase 4 or its utilizations as a dumping ground after phase 5. Among others three clay label fragments (fig. 5, e, i, m; fig. 8 b), four copper smelting dumps (fig. 3, a, b, c, f) and two stylized anthropomorphic clay figurines (fig. 4 b, c) were found here.

Phase 2 and post-1932

layers: ② A loose deposit of brick rubble, clay lumps and sherds.

① Eroded topsoil made of loose clay and brick rubble, partly covered in recent years by material related to kiln 1 of phase 2 as the result of continuing erosion. This deposit is made up of the following layers:

①a A floor laid above a preparatory surface of semisterile clay which had levelled the uneven ground surface.

①c A sherd fill in a corridor 1.10 m. wide.

①b Mudbrick layers at the bottom of two parallel superimposed walls which stand on the earlier deposits. (It is uncertain whether or not they represent a post-phase 2/1 building phase. This uncertainty derives from the fact that although they rest somewhat higher than the phase 2 kilns they might have been built at the same time but at a different ground level due to the uneven surface left by the standing remains of the buttressed stairway building of DF89 which was preserved to a height of 2.80 m. The evidence is too incomplete and disturbed to draw any conclusions.

①a A disturbed layer with clay lumps.

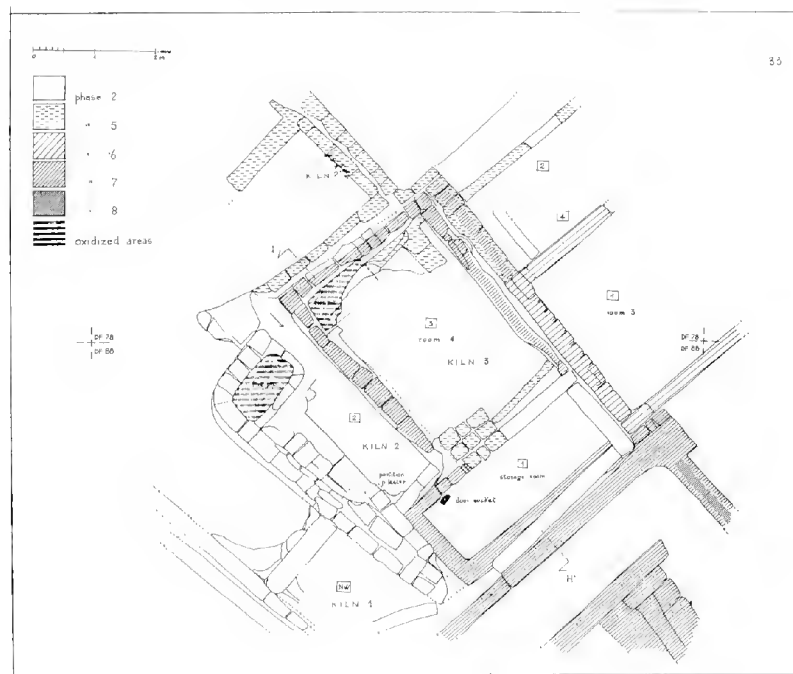


Fig. 9. Tappeh Hesār. Remains of pottery kilns in DF 78/88 belonging to phases 2, 5, 6, 7, 8. Scale 1:100.

Phase 7: the Storeroom Structure of DF88 /1/

Immediately to the north of the eastern end of the DF88 buttressed stairway building in DF88 lay a small storeroom /1/ with two adjoining areas or rooms, /2/ and /3/ on the north side (pl. V; pl. VI: section H1-I). This storeroom structure, which belonged to phase 7, had been built abutting the northern wall of the DF88 stairway structure. Over it was constructed the horizontal kiln of phase 2 (fig. 9). The well-preserved storeroom was rectilinear and measured 3.20 x 1.05 m. It had a single door opening to the north on one of the longer sides (fig. 10). It was a very finely plastered room still in a remarkable state of preservation. Its walls had been levelled in a systematic fashion at a height of approximately 70 cm. to provide solid foundation surfaces for later structures. Schmidt had only exposed the tops of these walls, leaving intact the deposit inside the room.

The entrance to the room had been rebuilt once. The original door, 57 cm. wide, had been well plastered with straight vertical jambs, 20 cm. thick. The door sill, 15 cm. high, was made of two and a half bricks set on edge in a single course. The door was located 45 cm. from the northwest corner of the room. A stone door-socket was found in the floor plaster inside the room 6 cm. from the western jamb (figs. 35, 36). It was a polished slab of dark green serpentine, 10 x 7 cm. in size, with a central depression for the door pivot 1.7 cm. in diameter. A similar serpentine door-socket (H 1812) was found by Schmidt in the fill of DG56 just off the east end of *South Hill* and was also assigned by him to period II. This socket was



Fig. 10. Tappeh Hesār. Two phases of doorway in DF88 /1/ seen from north east. Note in back-ground stone door-socket in original setting pertaining to the earlier phase.

smaller in size (4.4 cm. long), but its functional part (the depression) had an almost identical diameter (2 to 1.7 cm.). Schmidt described it as a « problematical object » (1937: 122, 400; pl. XXXI).

The well-preserved plaster, the clean appearance,



Fig. 11. Tappeh Hesar. View from south-west of two phases doorway in DF 88 /1/. Brick paving of later phase cuts the plastered door sill of the earlier one. Stone door socket in foreground.

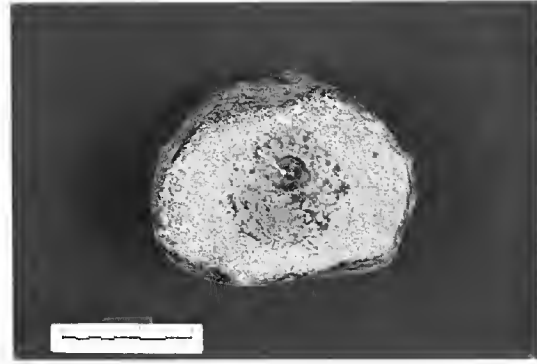


Fig. 12. Tappeh Hesar. Stone door socket from doorway in DF 88 /1/.

the small size, the isolated location at the back of the building, and the fact that it could be entered only through a narrow doorway with a high sill and a stone door-socket (indicating a closeable door) are all elements which suggest that this room was a store room for goods other than food provisions. The door would have been locked against the eastern jamb, probably by means of a peg-and-string device, as reconstructed on the basis of a functional analysis of sealings found in sites between Phaistos and Šahr-e Sūkته (Fiandra 1975: fig. 14). As a method of controlling access to storage this doorway system was both simple and safe. Doors could be locked with clay lumps molded on the spot into conical shapes encircling a peg which stuck out from the wall at an appropriate height above the floor a few centimeters from the door jamb. The door, whether made of light mats or heavy planks, pivoted in the socket and could be pulled shut by means of a single string. Once the door had been closed, the string could be coiled on the peg. The lump of clay, set in a conical fashion to encompass both the string and the peg, was ready to be sealed by the owner or the entrusted official before it dried.

Such a handy storage facility in this phase 7 building 1, consistent with the phase 8 finds of DF89 /5/ nearby (*counters*, inscribed label, slag from metal working), and with the kind of finely planned architecture of all the phase 7 structures on *South Hill*. (Later constructions in DF88/89 and surrounding squares exhibited lower standards of workmanship suggesting, as does the stratified debris, that the area by then was no longer the locus of administrative activity but was used instead for manufacturing activities, dumping yards, and burial ground.)

Over the floor of the storeroom DF88 /1/ lay a loose layer of fill ③ representing a single stratigraphic episode. The layer was from 18 to 22 cm. thick, and was almost totally composed of coarse brick rubble, large-sized pot sherds, and animal bones (pl.VI: section II, 1). The large buff ware sherds appeared to be piled against the wall of the southern half of the storeroom forming an artificial fill over the original plastered floor. Layer ③ possibly contemporary with the functions carried out in the room; material which had

then been wilfully thrown into the restricted space of the back part of the room. The items found in layer ③ differed significantly from those in layer ② which overlay it (see below). Apart from the larger sherds, the bricks and the animal bones, the area had been littered with copper-smelting slag, a few fragments of clay molds, and vitrified furnace linings - none of which occurred in layer ② above. In the eastern half of the room alone, beyond the original door jamb, about 2 kg. of slag was collected! Most significant, however, was the association in layer ③ of this large quantity of metal slag with clay objects shaped as *counters* and blanks for labels/tablets (fig. 5 a, b, d, f-h; 8 a, c). These items included five pillow-shaped clay objects between 3.5 and 5.7 cm. in length (H 76-91, 94, 95 bis, 96), and two presumed fragments of impressed *bullae* (H 76-92, 98). It would appear that these devices of administrative control were related somehow to the function of the building and to the process of metal working in general. It may be noted that similar items occurred during phase 8 in DF89, a fact which suggests that this general area continued to house some form of administrative/ metal working function in both phase 8 and phase 7.

On the top of layer ③ a second door sill was laid down. The new door connected the second stage of use of the storeroom with activity areas in the two adjoining rooms on the north (DF88 /2/ and /3/). The door of this second stage contrasted with the original one in its poor quality of construction. It had been broadened by 75 cm. by means of cutting away almost all of the eastern jamb of the original door. The new sill was laid about 15 cm. higher than the original floor on top of the brick and sherd fill. The sill itself was prepared by laying a coarse platform of nine bricks, 86 x 78 cm. in size (fig. 10, 11). These changes most probably were related to a change in the activities being carried out in the building.

This change appears to have been reflected in the upper layer ② of the stratigraphic sequence which consisted of a sequence of dumping episodes resulting in 40 cm. of trash intermixed with two main charcoal lenses, each of which provided a C14 sample (P-2765=5020 ± 70 bp or 3895-3765 BC). This deposit of thin-layered, slowly

sedimented, debris resulted from dumping activities carried out in the pre-kiln occupation of DF88 /3/ just north of the reused storeroom. This activity would seem to have belonged to either phase 5 or 4. Overfired sherds of buff ware; a few vitrified pieces of chaff-tempered ware; a substantial number of long chert blades with trapezoidal sections (three of which present polished surfaces); sixteen large riverine pebbles of basalt or gabbro showing traces of having been used as anvil-stones, hammers, pestles and/or smoothers; and a lapis lazuli stained flint blade made up the finds. It is the kind of assemblage that could accumulate only in the vicinity of a multi-functional production center such as the *South Hill* seems to have become from phase 5 onwards.

In addition to the above items, a flotation sample (no. 35) taken from the uppermost lens of charcoal in layer ② yielded three unfinished limestone beads and several flint splinters, although no plant remains were immediately identifiable.

Above layer ② lay the post-1932 loose soil deposit.

Little can be said about the fragmentary remains in the area of the two rooms DF88 /2/ and /3/ lying just north of storeroom DF88 /1/. Under kiln 2 (of phase 2) which overlies much of this area, at the base of the sequence in DF88 /2/, lay a brick structure which also extended below the fireplace of kiln 3 (phase 2). This structure, which had been cut apart by Schmidt's excavations, was almost certainly also a kiln but the shortage of time prevented its excavation. It lay on the same level as the later door sill of store room DF88 /1/, i.e., about 60 cm. below the floor of kiln 2 (pl. VI, section H₁-I). Above this structure lay three layers of coarse rubble, ⑥, ⑤, and ④, as shown in the section drawn below kiln 2 in DF88 /2/. Scraping this section yielded two lapis lazuli-stained blades in layer ④. Everywhere else in the excavated area such debris is related to phase 4 which has no evidence of architectural remains. Phases 6 and 5 are characterized by a rather broad spectrum of activities but no lapis lazuli. From this fact it may be concluded that the lapis in layer ④ indicated that phase 4 has been reached in this area by the time that deposit was laid down.

General Comments on Phases 8 and 7

Metal working activity was in full swing during phase 8; it continued to expand in phase 7, and began to decrease in phases 6 and 5 when other activities seem to have become important as well on *South Hill*. The buttressed stairway building of DF88 confirmed not only the close connections between the architecture of phase 7 and the underlying structures of phase 8, but also parallels in probable cost the sizeable investment in labor and material indicated by the industrial wastes dumped in the adjacent courtyard. The evidence points to a decrease in metal working after phase 7 relative to other activities. It should be emphasized that furnace linings and other less resistant pieces of evidence for metal smelting are almost totally concentrated in layers of phases 7 and 6. At the end of phase 7 the DF88 stairway building went out of use. The

connected sections from DF89 and DF88 (fig. 1, pl. VI) show a sloping horizon of phase 6/5 slag layers overriding the abandoned walls, much in the way that similar debris filled the phase 7 storeroom of DF88 /1/. In phase 4 which followed evidence for the working of lapis lazuli became abundant while that for metal working became rare. The latter is, however, still present unless its occurrence is to be explained as deriving from slag rolled down from earlier and higher dumps nearby. After a fairly long period of abandonment (pl. VI, section H₁-I) layer ② the local area was reoccupied and new houses built over most of it.

Very little can be added to the evidence for phases 8 and 7 the buttressed building in DF78/79. Here Schmidt's excavations had cleared almost the complete floor level. Due to lack of time during 1976 it was impossible to explore the small portion which Schmidt left unexcavated in the northern wing. Through the door to the south the building was connected with an open space which was later reduced and enclosed by the construction of the phase 6 and 5 houses. It is possible that in this open yard area some metal smelting was carried out, the debris of which was piled at the western side of it in DF89 /3/ where the section has shown a slow and repetitive process of stratification outside of the stairway building. Lack of time prevented the testing of this hypothesis.

The pottery found in this area from phases 8 and 7 suggests a period II date but Schmidt's typological scheme is too gross to distinguish the sequential ordering in terms of structural phases. This means that until a more detailed stratigraphically documented pottery sequence is developed it will be impossible to interpret the relative synchronisms among the sophisticated and carefully planned architecture, the artifacts indicating administrative control of production, and the metal working debris here and elsewhere at the site. Interestingly enough, none of these three variables is known to have occurred again during the later phases at *South Hill*.

Phase 6 and 5

Phases 6 and 5 exhibit the same degree of structural superimposition and continuity noted in DF89 between phase 8 and the buttressed stairway structure of phase 7 (pl. V). In the western sections of DF89 and in DF88 this structure has gone out of use but still stood to the impressive height of 2.70 m. This preservation was made possible by the use of the area as a dumping ground after the end of phase 7 as already noted. At this time the area east of the stairway structure in DF88 and Schmidt's buttressed house in DF78/79 to the northeast was cleared of rubble and levelled for the construction of new buildings. One new building, on the north, abutted the eastern wall of DF88 /3/ and /1/ and the northern face of the northeast corner buttress of the DF88 stairway building. A second, consisting of rooms aligned from north-to-south, abutted the eastern face of the same buttress (75 cm. wide) and the eastern buttressed facade, running further south. This phase 6 structure (DF89 /7/, /2a/, /2b/) was flanked in turn on the east by a third building,

DF89 /4/, /5/, /9/, which occupied much of the eastern half of DF89 in phase 5.

Of the buildings of phases 6 and 5 one, DF 89 /7-2/, presents a remarkable change in plan. Its best preserved part lies along the western side and consists of an alignment of rectangular rooms labelled from north-to-south /7/, /2a/, and /2b/. Rooms /7/ and /2a/ are separated by a possible open space numbered /8/. Room /7/ has a trapezoidal plan, 2.25 x 2.50 m. in area, and was constructed on the phase 7 surface which ran under the base of the under-wall of the buttressed stairway building of DF88 (pl. V). The abutting west wall of room /7/ and the adjacent buttressed wall of the stairway structure created an intervening space, DF89 /10/ which was used later as a dumping area for metal slag, furnace linings, charcoal, and other garbage such as the spine of a large *Ciprinidae* freshwater fish, the kind that might have been found in streams and ponds of the upper Dāmghān valley. Excavation of room 7 was carried down for only one course of bricks. Above the phase 7 floor, reused in phase 6, it could be seen, however, that a series of floors 60 cm. deep ended in a floor belonging to phase 5.

DF89 /2a/ was a room 2.45 m. long which was excavated only in its southern-most section following a test trench of Schmidt's which had been dug inside an overlying room of phase 2. A door 65 cm. wide opened through the south wall into room /2b/. The door sill was rather high from the floor, 32 cm., but there seems to have been some re-adjustments during phase 6 in relation to the raising of the floor level of room /2b/. Room /2a/ originally had been divided by a small east-west wall made of a single course of brick stretchers, 23 cm. thick. This wall had been cut away almost completely, leaving its traces in the plaster of the floor and the western wall.

Room /2b/ at the southern end of the building was well preserved. It measured 1.43 x 3.40 m. and was roughly trapezoidal in plan. Its western third was occupied by a solid square bench made of bricks (85 x 87 cm.) and a small receptacle 58 x 64 cm. in size (fig. 13). The solid brick bench or platform in the northwestern corner of the room had a step along its eastern edge made of a single brick (50 x 20 cm.) thickly coated with plaster. The function of this small room was clearly linked to the solid brick platform. Conceivably this could have been a small stairway surviving only in its lower portion, although parallel structures of comparable scale are not present at other protohistoric sites in Iran. Next to this structure in the southwest corner was a small receptacle set off from the room by a sill 55 cm. wide (pl. V).

With regard to changes occurring after phase 6, the section across DF89 /2a/ provides a good source of information (pl. VII). The deposit directly on the phase 6 floor was a 22 cm. thick layer of semisterile clay ⑥. Immediately on top, for the whole length of the room, lay a series of microstratified trash deposits 15-15 cm. thick, rather rich in charcoal and sherds ⑤. Then followed phase 5 wall foundation ④ made of three courses of irregular brick stretchers aligned with the walls of the phase 6 room. This foundation



Fig. 13. Tappeh Hesār: Room 2b in DF 89: detail of square platform in SW corner seen from north-east.

was 50 cm. wide and consisted of two rows of bricks. The wall which the foundation supported was only half as wide. A thick phase 2 wall was later built against this upper wall leaving beneath an indentation which contained several centimeters of the phase 4 deposit - layer ③ (pl. VII). This layer ③ ash and trash deposit lay against the abandoned phase 5 wall much in the same fashion as layer ⑨ in the north-south section of DF89/80 (pl. IV). A few lapis lazuli chips and one blue-stained flint drill were found in flotation sample no. 10 from layer ③. Layer ② was a 2-3 cm. thick charcoal lens found over the whole southwest-ern quadrant of DF89 lying just below the walls of phase 2.

This complex sequence was also noted along the eastern wall of DF89/2a/ which had also been used in three different phases. It was originally built during phase 6 when it was replastered at least twice. During phase 5 its entire length served as a counterforce for the east-west foundation to strengthen a north-south wall.

In phase 5 very little was used of the phase 6 building. The floors were raised approximately 40 cm. by an artificial fill of brick rubble. Standing structures of phase 5 were rather few as most of them were cut down during phase 4. Traces of wall occurred all over DF89 and it is possible that a large complex had been built over the ruined structures of phase 6 but leaving intact the eroded standing ruins of phase 7. This situation may explain why the earlier buttressed stairway structure of phase 7 remained better preserved than the neighboring phase 6 buildings on the east.

As we have seen, the sections in DF89 /3/ (pl. VI; sections A-B, B-C), the dumping yard south of the buttressed stairway structure and west of the DF89 /7-2/ building, showed that metal smelting was still being carried out during phases 6 and 5. It is possible that the two buildings lying to the east were the focus of that important function. If this was in fact the case, it could explain the use of two peculiar features found in areas /5/ and /9/ of DF89 /4/, the structure lying in the eastern half of DF89 with a floor level 40 cm. above that of phase 7 and 6. Here two small round kilns were found unfortunately cut to floor level



Fig. 14. Tappeh Hesār. Area DF 89 /4/ with metal smelting furnace of lot 5 in a corner of room view from south-east. The four shallow pits a-d are in the center of the image.

together with the surrounding walls at the beginning of phase 4 when the area was levelled to provide an open space. Area /5/ was in the northwestern corner of DF89 /4/. Here a rectangular basin measuring 42 x 115 cm. was set against the northern wall (fig. 14). Thirty-two centimeters to the south of it lay a circular kiln, ca. 50 cm. in diameter (fig. 14). The floor of the kiln was prepared with a heat-reflecting bed of sherds and several layers of thin plaster. Both round kiln and basin were oxidized red. Toward the eastern end of DG89 /4/ in area /9/ lay a round kiln of a different type. This kiln had been built 6 cm. from the southern wall of the room with a single coat of floor plaster overlapping the kiln and the wall (fig. 15). The plan was slightly clipsoidal, 46 x 43 cm., and the kiln contained a small (12-13 cm.) circular depression in the northeastern quadrant of its floor. This small depression lay about 4 cm. below the kiln floor which in turn was about 6 cm. below room floor. Several layers of red oxidized plaster were superimposed inside the kiln and of the floor nearby. G. Weisgerber (personal communication) believes that the size of kilns (45-50 cm. in diameter) and the degree of oxidation apparent may indicate that the kilns were in fact small metal smelting furnaces. It is interesting to note that reconstructions of furnace walls from the round horizontal sections of vitrified linings found in DF89 /5/ [6] and in DF89 /9/ suggest an internal diameter of between



Fig. 15. Tappeh Hesār. Remains of copper smelting furnace in DF 89 /9/ as seen from north.

40 and 50 cm. Only further investigation will allow confirmation of Dr. Weisgerber's suggestion.

If these small round kilns were actually smelting furnaces, it is possible that the uppermost slag in the dumps of DF88 was produced during phases 6 and 5. Certainly the kiln-like structure seen in the section at DF88 /2/ and /3/ below the pottery kilns of phase 2 (pl. VI: section II, -1) was too large (about 1 m.) and too little oxidized to be considered a metal smelting furnace. At present the evidence is poor and it can only be suggested that DF89 /4/ was part of a phase 5 building which may have been used to smelt metal.

To the east of the kiln in DF89 /9/, just beyond the edge of Schmidt's excavation, there is a wall, 10-15 cm. wide and 52 cm. high, with a coat of plaster over its rounded top. This small wall divided the long rectangular room /4/ into two halves and ended barely 30 cm. from the southern wall (pl. V). The area beyond it was left untouched by Schmidt and probably also by the phase 4 levelling operations to judge from the north-south section between DF89 and DG80 (pl. IV). The fill of this area (layer 7) on pl. IV consisted mainly of fallen bricks which remained exposed for a considerable period before they were cut by the pit of grave DF89 /13/. The grave was partly adjusted to the original exposed surface, layer ⑥, made of packed clay.

Phase 4: The DF 89 /4/ Structure and Pits a, b, c and d.

In the case of DF89 /4/ containing the razed furnaces in lots 5 and 9 the floor was disturbed at the beginning of phase 4 by four shapeless and very shallow pits marked DF89 /11 a-d/ (pl. V). Fortunately their contents had been preserved by a coat of silt deposited since 1932. All four of them had been dug haphazardly for use as trash pits.

A section through pit *a* documented a sequence of four superimposed clay floors, assignable to DF89 room /4/ and to phase 5. They alternate with 2 cm. thick ash lenses which contained a low percentage of charred remains. Each clay floor was between 1.50 and 3 cm. thick (pl. VII).

The contents of the four pits were recovered through dry sieving (2 mm.) and water-separation techniques and proved to be quite different in each pit:

Pit *a*: Soft gray/brown soil containing the largest floating fraction, mostly concentrated in the lowermost section. Recognized were seeds of wheat (*Triticum* cfr. *aestivum*), barley, flax, pulses, four fish jaws and one vertebra (flotation samples no. 11, 47).

Pit *b*: Almost totally filled with fish bones and small-grained brick rubble.

Pit *c*: Packed loose soil, up to 5 cm. thick, originally rich in organic matter, close in color and consistency to layer ⑥ in the DF89/DG80 north-south section (pl. IV). The pit contained several lapis lazuli chips and a great number of flint flakes. Among these were three flakes and one drill with the usual lapis lazuli stains. A sizable quantity of fish bones was recovered here as well.

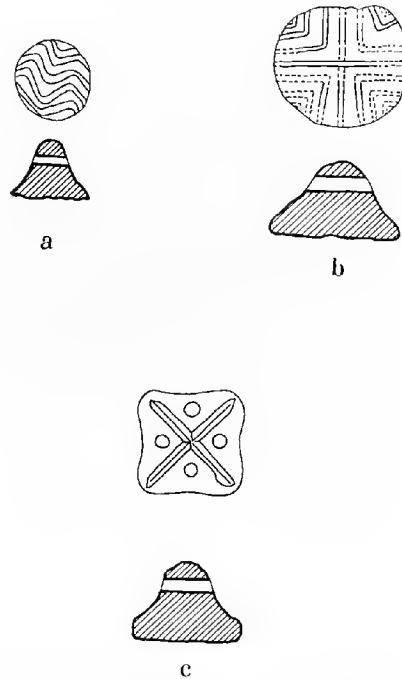


Fig. 16. Tappeh Hesār. Prismatic stamp seals of burnished ceramic: a from DF 89 /11/ ③; b from DG 80 West, Sahr-e Süxteh, period IV; c, prismatic stamp seal from floor of Burnt Building.

Pit *d*: The deposit was disturbed by a large bush that was removed the first day of work. Scattered fish bones and a few flint flakes were found by scraping the edges of the pit.

Food remains were therefore mixed with the daily debris of labor, a not unlikely discovery in the dump of a specialized activity area in a pre-industrial settlement. Of particular interest here is the various contents of each of these pits: food remains in pit *a* and *b*, flint *débitage* and a few bone in *c*.

This last pit provided another important artifact: a terracotta conical stamp seal, H 76-39 (fig. 16). It has a diameter at the base of 1.8 cm. and a height of 1.3 cm.; the design represents a group of parallel zigzag lines which fills the whole base. This type of stamp seal was first reported from Tappeh Hesār by Schmidt. With the expansion of archaeological fieldwork in eastern Iran and southern Central Asia questions have arisen concerning the meaning of their distribution. Seals of this type are made of burnt clay with a thick burnished slip in such a crude fashion that one would expect them to be either a very common object in protohistoric Iran or a local inexpensive imitation of other seals. At Hesār Schmidt reported five of them found in a stratified context: three from DF89 (H 1728, 1782, 1785), one from DF88 (H 2585), and one from DF79. Two other specimens were published by Schmidt which were out-of-context and labelled « refuse »: H-20 came from somewhere on plot D which represented the whole of the *South Hill* and was assigned to IC-IIA (1933: pl. XCI; 1937: 396); and H 1964 was found in the CF47 refuse and assigned to period III (1937: 402). An additional specimen was found at the beginning



Fig. 17. Tappeh Hesār. Room 9 from east. Note the round shaft entry of grave 12 in the back side of the room.

of the 1976 work in undisturbed sediments in DG80 layer ① west, the dump piled from the phase 4 deposit in DF89 by Schmidt's workers (fig. 16b).

Both Schmidt's and our evidence suggests that these seals were produced at Hesār during period II with the highest incidence occurring in the «industrial quarter» of the ancient town, i.e. *South Hill*. All seven specimens found in stratigraphic context come from this location. Those found in 1976 on *South Hill* were associated with phase 4, somewhere in the first half of the third millennium B.C.

A seal of this type (fig. 16) was found during 1969 in Sistān in Sahr-e Sūxteh IV from the well stratified deposit of the Burnt Building (Tosi 1983: 157, pl. LXXIV, 75). Others have now been recovered from the earliest assemblage of Pirak, a site in northern Baluchistan (Jarrige and Enault 1976: 36, pl. XIII no. 12-24). At both these sites the cultural and stratigraphical contexts place them within the first half of the second millennium B.C., a date far too late for phase 4 in period II at Hesār. The explanation of such a selective line of evolution and the peculiar pattern of distribution is an interesting subject for future research.

Phase 4: The Stratigraphic Context of the Lapis Lazuli Workshop

As stated above, phase 4 presented no structural remains within the explored sectors on *South Hill*. Nevertheless it was remarkably well documented from a stratigraphical point of view. The whole area was used to dump great quantities of lithic *débitage* from the working of lapis lazuli and other semiprecious stones. At the time the earliest layers of this dump were deposited none of the earlier buildings of DF89 appear to have been in actual use. The soil matrix of the lapis lazuli and flint debris was either a soft brownish soil with little clay and rather rich in organic matters,

or a gray ash with intermixed thin lenses of charcoal. This deposit was first located in the DF89/DG80 section (pl. IV). The thickness of this deposit, the phase 4 dump, generally varies between 50 cm. at the western edge of DG80 to a little less than 15 cm. at DF80 /3/ between layers ③ and ④ along its southern section (pl. VI: section B-C). The layer was spread over most of the *South Hill* judging from reported surface occurrences at DF58/59 and DF63/64. Such a layer must represent a sizable production. This is particularly apparent if one considers that all the lapis lazuli *débitage* found in the excavations were strictly limited to the phase 4 sediments.

An area at the western end of the DF89 /4/ structure, provided additional evidence on the stratigraphic position of the lapis lazuli workshop. The evidence consisted of a small soil pocket, related to layer ②, left undisturbed by Schmidt's workers. Two bricks resting on top of it looked like a continuation of the phase 5 wall built across DF89 /2a/ and this probably is why it was left untouched. The deposit was just 20 x 20 cm. in size, with a thickness of 18 cm, beginning at the top of the phase 5 floor in DF89 /4/. It contained the jaw of a sheep, a calcaneum of *Bos*, two pieces of metal slag, and 150 gr. of flint *débitage* with flakes spotted with lapis lazuli dust. This surviving fragment of the original lapis lazuli working deposit was almost certainly the continuation of trash-layer ③ found between the two phase 5 foundation walls in the DF89/DG80 section (pl. IV) a few meters to the east and also of layer ③ which was sandwiched between the phase 5 foundation and the phase 2 wall in the northern section of the test trench in DF89 room /2a/ (pl. VII).

The final evidence for the stratigraphical position of the lapis lazuli workshop came from the eastern part of the south section of DF89, where the exposed layers of deposit can be ascribed to phases 6-2 with a

good record of the phase 3 burial disturbances as well (pl. VI: section A-B).

Here eight major stratigraphical episodes have been located which slope downhill following the lateral erosion of the mound:

- Phase 6: ⑧c - ⑧a A series of three superimposed floors.
 ⑦c A trash deposit in alternating thin layers of trash and ashes.
 ⑦b A layer of clay lumps from collapsed bricks.
- Phase 6 (?): ⑦a Thin layers of rain-laid silt.
- Phase 5: ⑥ A floor and underlying clay preparatory surface related to a wide east-west wall disturbed by burial pit ③, and built on top of a phase 6 floor.
- Phase 5 (?): ⑤ A 10-12 cm. thick layer of clay from collapsed bricks consolidated on top the phase 5 floor ⑥ and possibly documenting a period of abandonment.
- Phase 4: ④ Thin-layered trash deposit, between 15 and 25 cm. of width, contained within abandoned rooms of phase 5 and disturbed by burial pit ③.
 Lapis lazuli stained flint was found by scraping the deposit below the phase 2 floor.
- Phase 3: ③ A burial pit, with scattered bones on the bottom, filled with loose brownish soil; the vertical pit has cut into three phase 6 floors. Unfortunately it lies ca. 20 cm. from the section and it was not possible to relate its disturbance to the available stratigraphic sequence. The bottom is at a depth of 52 cm. from the topmost phase 6 floor. Elsewhere graves relate to phase 3.
- Phase 2 and later: ②c A phase 2 foundation trench.
 ②a A phase 2 floor and underlying clay preparatory surface.
 ②c A very thin layer of animal dung above the floor.
 ②b An uneven layer of sterile clay from collapsed bricks with sherds.
 ②a A thin-layered animal dung deposit.
 ① Schmidt's rubble.

In summary, the deposits of lapis lazuli debris of phase 4 on *South Hill* have been stratigraphically correlated with the rest of the sequence in the following undisturbed locations:

1. DF89/DG80 N-S section: layers ⑨b and ⑨c on top of a phase 5 floor (pl. IV).
2. DF89 /2/ E-W section: layer ③ between the phase 5 foundation and the phase 2 wall (pl. VII).
3. DF88 /1/ layer ②: a few stained flints in the phase 4 or 5 dump (pl. IV: section H₁-I).
4. DF88 /2/ and /3/: two stained flints in layer ④ laid between phase 5 (?) and phase 2 in the N-S section (pl. VI: section H₁-I).
5. DF89 /0/: group of flints in undisturbed soil left below two bricks above phase 5 floor of DF89 /4/ (pl. VII).
6. DF89 /1/ E-W section: one stained flint in layer ④ between floors of phase 5 and 2, disturbed by a phase 3 pit grave (pl. VI: section A-B).

7. DF89 /3/ E-W section: a large quantity of lapis lazuli and flint debris thickly packed between charcoal lenses ⑩ and ⑪. A direct continuation of DF89 /1/ layer ④ to the west of the phase 2 wall (pl. VI: section A-B).

The foregoing evidence certainly does not provide an even distribution of artifacts. A massive cluster indicative of a specialized activity area is only found in DF89/ DG80, where the thickly-laid deposit on top of area /4/ has a width of 40-50 cm. The other occurrences are sporadic spreads with the possible exception of DF89 /0/ which might well have been a surviving segment at the western edge of the DG80 dump. The evidence does show that there was an intense and restricted lapis working period which on this part of the site must have lasted a short time. No traces of stained flints have been found in this area in earlier or later undisturbed contexts. Although more fieldwork is needed to test any general statement, there seems to be enough evidence to conclude that lapis lazuli working on the *South Hill* of Hesār was a short episode whose existence might have been brought to an end by fluctuations in the local availability of the raw material as lapis lazuli was imported from Badakshan, a distance of ca. 1800 km.

General comments on the lapis lazuli and associated flint assemblage

At this point a brief report may be given on the first results obtained from the examination of the small drills, flakes, backed tools and tiny flakes of lapis lazuli from DF89/ DG80 in *South Hill*. During the actual excavation campaign it was possible to complete a preliminary classification. Therefore, for the moment the report does not deal with the thousands of tools found by sifting the loose soil from Schmidt's excavations in the same area.

It must be born in mind that, although the interpretation proposed here is believed to be valid in broad terms, a more exhaustive examination of the material could bring about changes in the details.

The flint implements from the 1976 excavations in square areas DF89 and DF88 number 4220 in all. The subdivision into various types can be shown in percentages as follows:

polished blades	0.11%
blades	3.27%
bladelets	0.97%
end-serapers	0.02%
burins	2.79%
burin-spalls	1.54%
backed-tools	2.77%
truncated-tools	0.07%
drills	4.47%
denticulated tools	0.07%
borers	0.18%
retouched flakes	0.26%
flakes	10.07%
waste	67.64%
cores	0.67%

The method of producing drills at Tappeh Hesār led to an enormous waste of raw materials and a great number of large-sized flints littered the activity area

in contrast to the workshop materials excavated at Šahr-e Sūxtēh in the EWK/EWP area in 1972 (Tosi and Piperno 1973). The working of the lapis lazuli and the making of the flint tools apparently took place at Hesār in the same workshop. Of the entire lithic complex examined, 527 implements are directly connected with the lapis lazuli working. The percentage of each of these tool types within the collection is as follows:

burins	22.39%
burin-spalls	12.33%
backed tools	27.89%
drills	35.86%
borers	1.51%

The quantitative relationship among burins, burin-spalls and drills confirms the hypothesis put forward as a result of the 1972 surface survey. It appears that burins were used as cores for the production of burin-spalls from which various types of drills were obtained by step retouching (Bulgarelli 1974: 22-23; 1979: 39-54).

The implements with traces of lapis dust in the collection are rather numerous: 382 in total. In addition to the types found in 1972, there are also burins, burin-spalls, backed tools, notches, borers and waste. These tools bearing lapis dust can be subdivided into the following percentage groups:

blades and flakes	19.89%
burins	6.81%
burin-spalls	3.14%
backed and truncated tools	4.97%
drills	39.37%
borers	1.84%
retouched flakes	2.88%
waste	14.40%

The presence of powder spread over the dorsal and ventral face of some implements clearly had nothing to do with the use of these implements. This fact suggests that during the working of lapis, large quantities of powder were produced which then adhered to discarded implements lying on the workshop's floor. This hypothesis is supported by the quantitative data related to the distribution of lapis powder distinctly relating to the function of different implements. For the total of 150 drills, of which only 52% were complete, in studying the distribution of the traces of lapis, only the complete ones were taken into account since 35% of the fragments consisted of drill-heads and this would have falsified the percentage ratios. The lapis lazuli traces occurred in 18.92% on the point, in 37.84% on the whole head, in 14.86% on the head and notches, in 27.03% on the notches only, and in 1.35% only on the hafting base. For this class of implements, therefore, the distribution of lapis lazuli traces is closely linked to the function of the tool itself.

For the burins (26, all of them complete) the examination showed that they were used in lapis lazuli working either as burins, as evident from the traces present on the angle and on the truncation (26.92%), or as flakes or blades, as can be seen from the deposits along the edge (65.38%). In only 7.69% are blue traces present on both faces and these are not connected with the use of the tool itself. In the case of the other lapis

lazuli stained implements - blades, flakes, retouched flakes, borers and notches - the percentage of the traces connected with use of the implements are over 75% except for backed tools and truncations, where it goes down to 52.63%.

Among the flint *débitage* subdivided into two groups according to size variability (small irregularly shaped flakes and tiny chips from retouch or preparation of cores) it can be seen that 100% of the flakes which are too small to be used in any way have lapis lazuli traces on the two faces and on the straight platform scars, while the 56.52% of small flakes which could be used with a handle have lapis traces along the edges as a result of use.

The presence of this flint debris with lapis traces not connected with their actual use, again shows that the preparation of the flint tools took place in the same workshop where the lapis lazuli beads were being produced.

Phase 4: The Morphological Character of the Deposit

Certain morphological characters of the phase 4 deposit at DF89 of Tappeh Hesār recall those of another protohistoric stone working activity area in eastern Iran: phase IVBI at Tappeh Yahya. Chlorite debris, chips and blanks are spread in a 90 cm. thick stratum all over the southern section of the mound in thin layers of ashy soil with no architectural remains (Kohl, 1975: 19). Kohl (1978: 78) states that this latter characteristic «probably attests to the impoverished conditions under which production was carried out...». Yet conditions appear to have been identical also at Hesār, an important town in northeastern Iran, in an area utilized for the manufacture of a valuable imported stone such as lapis lazuli. It is likely that the similarities in the deposition process at Yahya and Hesār originated from similar working habits carried out in stone-manufacturing workshops in the whole of eastern Iran during the third millennium B.C. Both at Hesār and Yahya the dumping area was located in an open space of abandoned structures which in earlier periods were important buildings in terms of administration and production. In both instances one may speculate as to whether or not further horizontal excavation might not still encounter related architectural remains.

At Hesār the period of lapis lazuli working on *South Hill* ended with the abandonment of the area temporarily. In phase 4 no proper buildings appear to have been constructed in the area of study. Rather, workers simply worked in the open air making use of what was left of the phase 5 walls and floors. In this sense the area had already become marginal to the main settlement (which lay north and east) in contrast to its position in earlier phases when metal working was in progress. It is not without interest that these more sophisticated structures of earlier times were associated with the processing of copper - a resource of local origin which was far more essential to the production system than were the luxury items made of lapis lazuli.

Phase 3: The Burial Ground

At the end of phase 4 the western part of *South Hill* became a burial ground. A total of over 100 graves were located by Schmidt in squares DG60/70, DF78/79/88/89. A large number of these were assigned to his late II-early III horizon. No grave was located in 1976 in the undisturbed deposits of phases 8 through 4. Apparently the burial area for these phases lay elsewhere on the site. In phase 3 the *South Hill* became distinctly marginal to the town's activities.

Three graves were located by the 1976 excavations: one in DF89 /13/, another in DF89 /12/, and a third in DF88 lot 1. All three appear to be related to Schmidt's cemetery horizon, our phase 3.

The grave located in DF89 /13/ (pl. V) contained a skeleton which probably belonged to a young woman. The body lay on its right side in a contracted position with the head facing north. The upper half of it was preserved only to the fourth lumbar vertebra. The grave was situated just a few centimeters below ground level and several bones had been fractured by recent disturbances. The furnishings consisted of a pedestal bowl of burnished black-grey pottery which had been placed at the back of the head. In the bottom of the bowl was a thin layer of finely powdered limonite which amounted to a little more than a gram. The practice of burying small quantities of ochre in graves is one that has been previously reported from Zaman Baba (Kuzmina 1958) and Sahr-e Sūxteh (Piperno and Tosi 1975) where lumps of iron oxides were found near the skeletons. The pit of grave DF89 /13/ was very small and the skeleton hardly fitted into it. The edge of the pit ran along the face of the section.

Scattered remains of other burials had been exposed by the wind a few centimeters from the western edge of this grave. These were also part of the cluster of burials Schmidt has excavated in DG70. This group of graves lies stratigraphically under the latest structures of this square which date to phase 2 and later.

A second grave was found in DF89 /12/ (pl. V). This type of shaft-grave was identified during Schmidt's excavations and is known also from Tureng Tepe II (Deshayes 1965: 87; 1969: 13-14), Sahr-e Sūxteh (Piperno and Tosi 1975) and much later in early Iron Age Dinkha Tepe in western Iran (Dyson, personal communication). The shaft had a diameter of 0.75 m. and a maximum preserved depth of 52 cm. in the northern half. It had a perfectly circular section down to 0.30 m. At this depth the southern half of the pit had been dug out, thereby giving an L-shape to the vertical cross-section of the grave itself. The maximum preserved depth of this part of the grave was 65 cm. The earth fill was extremely loose and friable, and powdery in the immediate vicinity of the skeleton. This skeleton was excellently preserved and tightly contracted (fig. 18). It lay on its right side and was found with the trunk sloping steeply towards the bottom of the grave, partly resting directly on itself with the arms folded on the chest. The head occupied the dug-out alcove of the grave and faced downwards.

The grave goods comprised only a conical beaker of burnished black pottery laid to the left of the skull.



Fig. 18. Tappeh Hesār. Grave 12 in DF 89 room 9 seen from north.



Fig. 19. Tappeh Hesār. Grave DF88 /4/.

A third grave, DF88 lot 1, was the only other grave found during the 1976 campaign (pl. V). It was a pit grave, although the extent of its western edge and part of its southern boundary were not ascertained. The shape of the grave was probably roughly rectangular with a rounded eastern edge where the skull rested. The northern boundary consisted of the large, plastered northern wall of the phase 7 buttressed stairway structure. The cross-section of the grave rose slightly towards the east. The skeleton was extended with the face turned towards the right shoulder. It was undisturbed. A few phalanges of the hands and feet became disconnected during the excavation of the grave because of the extremely loose and powdery soil. No grave goods were found (fig. 19).

Phase 2: Kilns and Other Structures

Although this area of *South Hill* had been abandoned at the end of phase 5 as a building area the process was not irreversible: in phase 2 the whole area was resettled following its use as a cemetery in phase 3, with the construction of the pottery kilns (pl. V, figs. 33, 44) and several dwellings already described elsewhere (pp. 9-20). In DF9 /3/ layer ① indicates that life continued later as well but most of the record of that development is now lost for the area under



Fig. 20. Tappeh Hesar. Pottery kilns 1 and 2 in DF 88 seen from north-west.

study. Some indication is given, however, by a single undisturbed grave dug into the top of kiln 4 in DF79 3/. The grave contained a contracted skeleton which lay directly on the floor of the underlying fire-pit. It can, therefore, be safely assigned a date later than

phase 2. The same can be said for DF88 X-23, a grave which lay inside kiln 2 as recorded by Schmidt (1937: fig. 62). Thus there is every reason to believe that the area was used as a burying ground a second time following the abandonment of the kilns of phase 2.

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VI. THE STRATIGRAPHIC SEQUENCE OF THE MAIN MOUND AT TAPPEH HESĀR, 1976

Susan M. Howard

From the time of Erich Schmidt's original excavations at Tappeh Hesār (Hissar) in 1931 and 1932 the site has been of particular importance in discussions of the culture history of this area of the ancient Near East. Its importance is due to the depth and extent of its occupations and also because it remains to this day the only excavated Bronze Age settlement on the north-eastern Iranian plateau. Its unique geographical position along an important trade route, the Xorāsān Road ultimately connecting Mesopotamia with the Far East, has made Hesār critical to interpretations of the culture history of northern Iran and adjacent regions. Hypotheses on Indo-Aryan movements and the origins of the Iron I period grey ware in western Iran have been based on changes within the artifactual assemblage at Tappeh Hesār (Deshayes 1969; Dyson 1973; Winn 1974).

The problem with these discussions is that they are based on materials from Hesār which have been sequentially ordered largely on a stylistic rather than a stratigraphic basis. The contextual relationships of the artifacts from the mound are for the most part lost and the published reports have dealt only with selected artifact types from graves rather than the full cultural inventory.

The explicit intent of the excavators in the early 1930's was to excavate stratigraphically but the recording of the stratigraphy was inadequate due to the lack of technical sophistication, the small number of qualified staff, and the appearance of a large number of graves which had disturbed large sections of the original stratification. During excavation the building levels were recorded in such a way that the several superimposed construction phases were never adequately defined. As a result both the architectural plans of individual houses and the contents of individual rooms were documented inadequately.

The aims of the work carried out during the 1976 field season on the Main Mound were twofold. The first aim was to establish the stratigraphic ordering of the artifactual remains and the second was to provide an accurate description of some of the architecture which had been exposed in 1931. The Main Mound was the most appropriate area of the site for such a study. The Main Mound was centrally located within the settlement, and remains to this day the highest point of the site (fig. 3). Excavations in this area by Schmidt had uncovered over 2400 square meters of architecture attributed to period III A, B, and C. This excavation was the largest area of exposure of this period at the site. Moreover, all of the occupation

periods which had been defined at Hesār were known to be represented in the Main Mound (Schmidt 1937: figs. 21, 61, 83). Schmidt excavated one square (DF 09) to more than 3.50 m. below the level of the exposed «period III» walls and here identified period II and I remains although he did not reach the base of the deposit.

The 1976 field strategy consisted of cleaning and drawing baulks P 12, 13 (Pinnacle Baulk in DG 00) and I (wall 42 in CG 90). These baulks provide over 22 m. of vertical section from which to re-interpret the stratigraphy and architecture exposed during 1931-32. Once these baulks were cleaned the architecture in the adjacent squares, CG 90, DG 00/01, as well as Buildings 2 and 3 to the south, were investigated in order to reveal further details of their construction features and their plan as well as their stratigraphic relationships (fig. 1; see also Part VII).

Excavation of baulk P, as well as a sounding down the northern end of baulk 13, offered the possibility of sampling architecture as well as sherds, bones, seeds, slag, and of collecting radiocarbon samples on the Main Mound from its highest point to as far down as time would allow. These artifactual and organic materials are critical to an evaluation of the evolutionary sequence and also provide a valuable addition to the subsistence, technological, and environmental information accrued from other field research carried out in various areas of Tappeh Hesār and its hinterland.

Proper identification of the various periods represented in this portion of the Main Mound and final conclusions on the nature of the changes occurring in this area must await final analyses. The pottery fragments are currently being analyzed in an attempt to discriminate technological and stylistic variations which might be chronologically significant. For this reason only rough percentages of the various kinds of pottery are given in this preliminary report. A more detailed description and evaluation of the pottery will be forthcoming. The radiocarbon samples have been submitted to the Radiocarbon Laboratory of the University of Pennsylvania and the results have been incorporated into this preliminary discussion (see Part XVI). These two important sources of information, together with the analyses of the bones, seeds, soils, and metallurgical debris, are invaluable for a proper understanding of the changes occurring within the site.

When all of the information from the Main Mound is available it can then be evaluated with similar investigations carried out during 1976 on the North Flat and the South Hill. Only then can the occupational

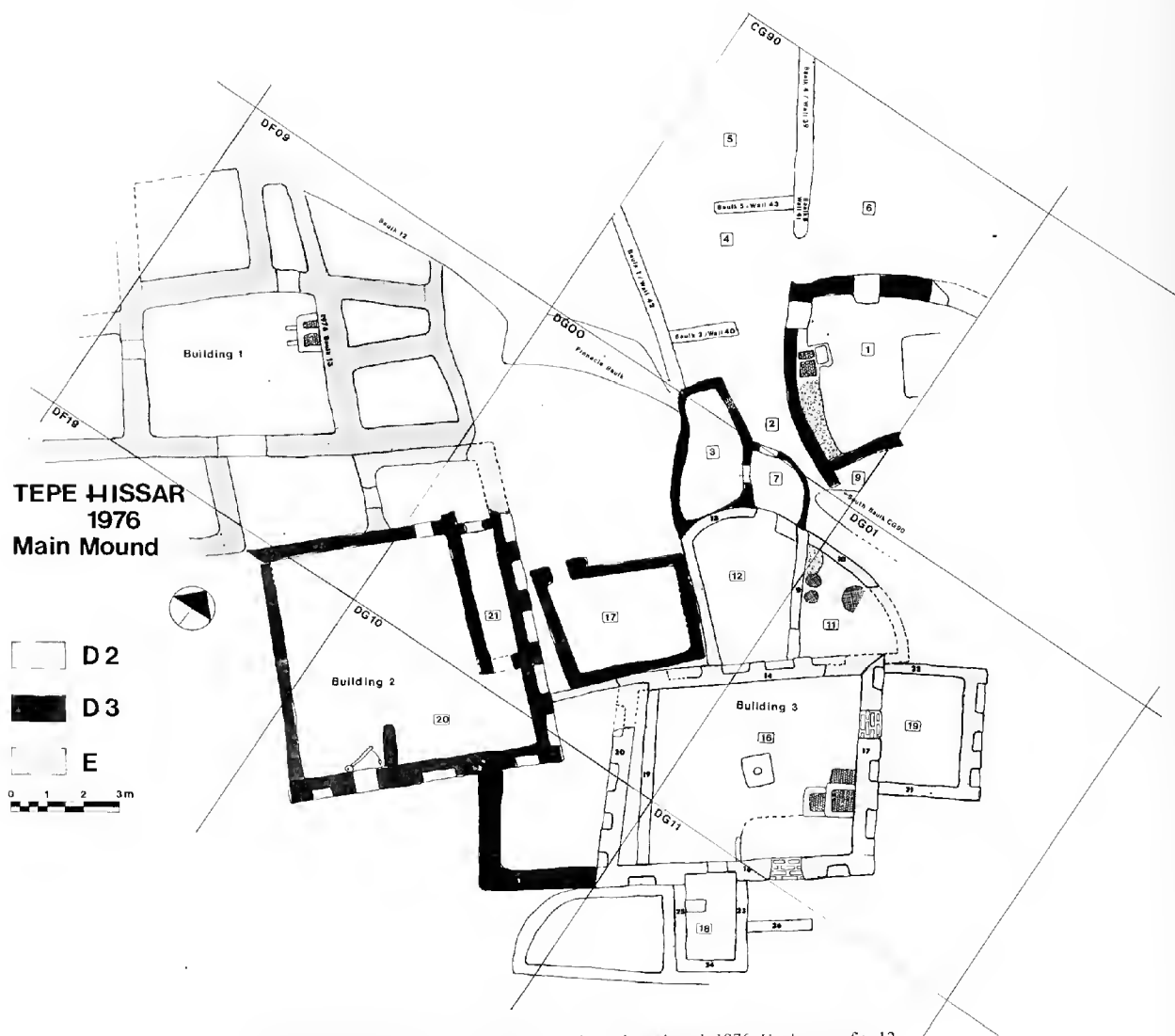


Fig. 1: Main Mound 1976: Plan of Main Mound area investigated, 1976. For key, see fig. 12.

sequence at Hesār begin to be properly understood. Nevertheless, it will be useful to outline here some of the preliminary information on stratigraphy and architecture in the Main Mound as it became evident during the field season.

STRATIGRAPHY

The periodization of the mound as defined by Schmidt (III C, B, A; II B, A; I B, A) is not consistent with the architectural levels which he himself described. His published plans (1937) often identify structures as belonging to levels «somewhere between» those of period IIIC and IIIB, for example. The 1976 work on the Main Mound confirmed the complexity of the stratigraphic sequence. A description of the stratigraphic relationships among the architecture exposed in squares CG 90, DF 09, DG 00/01/11 and DG 20 must begin with a re-definition of the occupational sequence.

The sequence presented here has been interpreted from the series of exposed sections and their correlation with the architecture standing in the vicinity (fig. 1-4).

Table 1 outlines the strata from baulks 1, P, 12, and 13, defines the stratigraphic sequence as it is interpreted for this summary, and correlates the strata with the periods assigned by Schmidt in the 1937 final report. In order to clarify the discussion, the construction sequence has been labelled from the top down, «A» being the uppermost building stage and «I» the uppermost depositional phase within the building stage. The Arabic numbers in parenthesis represent the strata and have been placed in Table 1 as a reference to the drawings.

Building Stages F and E

The earliest architecture uncovered during the 1931 excavations in the Main Mound was from restricted

Table 1

SCHMIDT'S PERIODS	1976 STAGES	MASCA CORRECTED C 14 DATES	STRATA	DESCRIPTION	BAULKS
IIIC	A	2150-1885 B.C. (P 2620)	(1)	walls and surfaces	1, P
	B		(2)	brick melt and trash	1, P
between C and B	C1		(3)	layered soft trash, wash and fill	1, P, 12
	C2		(4)	walls, fill and trash	1, P, 12
IIIB	D1	3360-2995 B.C. (P 2708)	(5)	trash, burned, brick melt	1, P, 12
	D2	3175-2920 B.C. (P 2710)	(6)	walls, brick melt, trash	1, P, 12
	D3	3355-3165 (P 2711)	(7)	walls, trash, brick melt	1, P, 12, 13
		3375-3150 (P 2707)			
II and I?		3380 (P 2709)			
		3380-3160 (P 2621)			
	E1		(8)	clean fill	12, 13
	E2	4590-4545 B.C. (P 2774)	(9)	brick melt, fill, little trash	13
	E3		(10)	wall, trash, some brick melt	13
	F1		(11)	melted brick and trash	13
	F2	4345-3515 B.C. (P 2622)	(12)	trash lenses	13
	F3		(13)	wall and ash	13

unexcavated cultural deposits below

-----: hard clay surfaces
 ———: construction stages

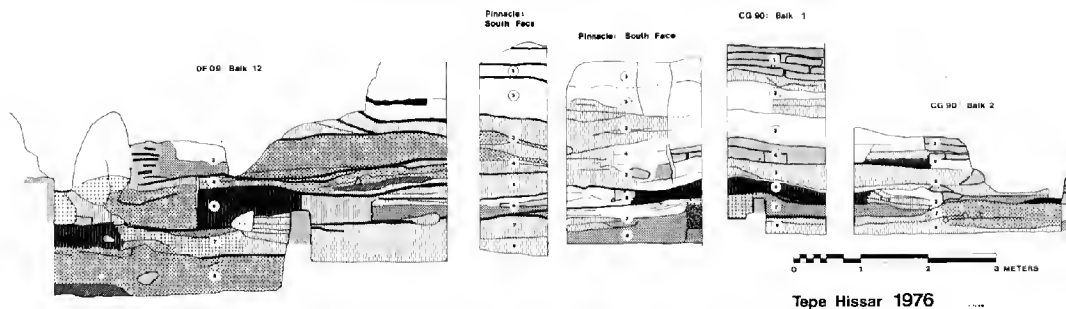


Fig. 2: Main Mound 1976: DF09 Baulk 12, south face. For key, see fig. 12.

areas within square DF09. Schmidt reports period II and I remains from here (1937: 22, 105). Unfortunately, the architecture from these earlier levels was removed in 1931 and there is no adequate description of these remains either in the published reports or in the Schmidt archives in the University Museum. Baulk 13 (fig. 4), running 6 m. diagonally northwest to southeast across DF 09 shows at least three major construction stages. The lowest two of these, according to Schmidt, represent remains of Hesar II and I. The lowest stage exposed, F, incorporates strata (11), (12), and (13). These three strata include a good clay surface on which a wall is standing (13), ash and trash lenses deposited alongside the wall (12), and an uppermost stratum of brick melt and trash (11). Stage E includes a brick wall with trash (10), then brick melt with some trash and fill (9), and finally relatively clean fill capping it (8). A radiocarbon sample from the trash in stratum

(12) produced a date of 4345-3515 B.C. (P-2622). The 1976 sounding in this area was very restricted and proper description and delimitation of these earlier periods on the Main Mound can only be accomplished with further excavation in this area.

Building Stage D

The architecture which remains exposed on the Main Mound belongs to the later periods of settlement. In the published plan (1937: fig. 86) Schmidt has defined the architecture of square CG 90, DF 09/11, DG 00/01/11 and the lower DG 20 as belonging to period IIIB. In fact radiocarbon determinations, certain architectural features, and the pottery indicate that this architecture actually is assignable to Schmidt's period II (see below). The 1976 investigation have established that within the construction level represented by this exposed architecture there are at least three

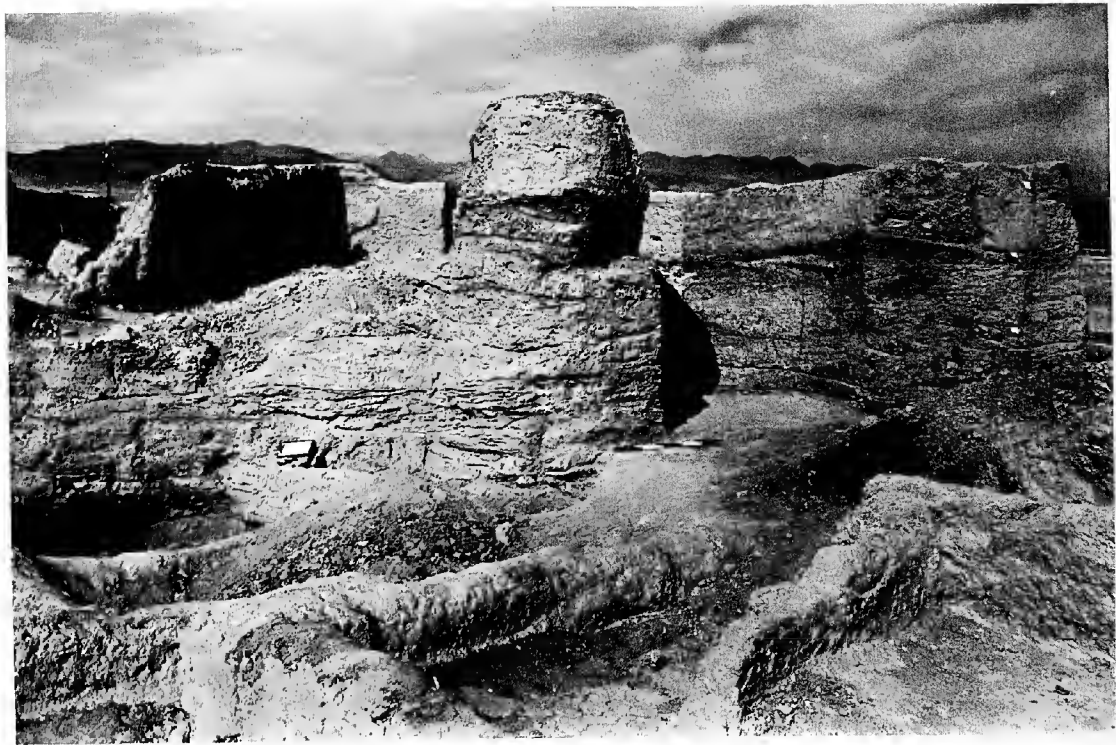


Fig. 3: Main Mound 1976: DF09 Baulk 12 and the south face of the Pinnacle

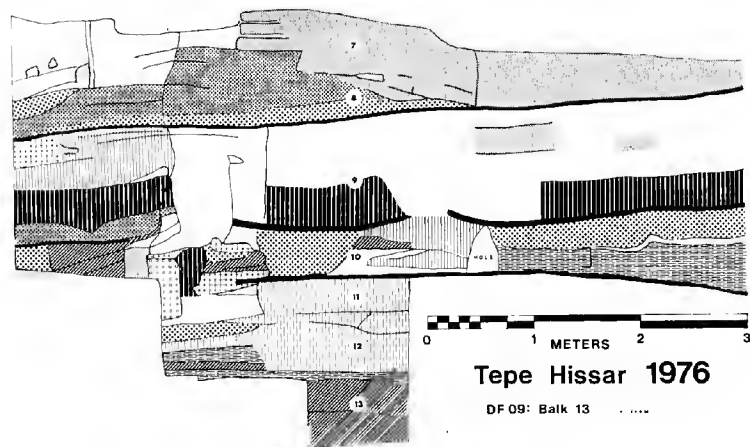


Fig. 4: Main Mound 1976: DF09 Baulk 13

depositional phases, D3, D2, and D1. The definition of stage D and its phases is more reliable than the earlier ones (E and F) as it can be traced across 22 m. of baulks 1, P and 12 (fig. 2).

Square CG 90 lies at the foot of baulk 1 and had not been properly excavated down to a single building level in 1931 due to the large number of burials encountered in this area. During 1976 the excavation of this area was completed (fig. 1). It was determined

that rooms /3/, /7/, and /1/ had been constructed within phase D3. Although these rooms were basically contemporaneous, rooms /3/ and /1/ had been built at the same time, room /7/ appears to have been added slightly later. Room /7/ was then partially filled up and continued to be used throughout D2 and perhaps D1. Radiocarbon determinations confirmed these stratigraphic conclusions: the floor deposit of room /1/ yielded a date of 3380-3155 B.C. (P-2709), room /3/

dates of 3375-3150 B.C. (P-2707) and 3385-3165 B.C. (P-2711), and room /7/ the date of 3175-2920 B.C. (P-2710). Room /3/ was not in use during the later D2 and D1 phases as a small wall ran immediately over the burned fill of this room at a level contemporaneous with D2 in baulk P. Whether room /1/ continued to be used during D2 and D1 can no longer be determined since the later deposits were removed by Schmidt.

Building 2 (Schmidt 1937: fig. 86) to the southwest of CG 90 was also originally constructed during D3. The central room, /20/, of the building, at the time of its original construction, was contemporary with room /17/ to the east. The base of the walls of room /17/ correspond with phase D3 in room /3/ to the east and with the P baulk to the north. Additional courses of bricks were later added to the tops of the walls of both the central room of Building 2 and room /17/. The plaster along the interior of their walls runs out about half-way down, indicating that an upper, later floor level must have existed but was excavated through in 1931. The rooms clearly had two major construction phases (see Part VII). Moreover, a series of niches can be outlined along the exterior of the northeast and southeast walls of the central room /20/ which were filled and plastered over during a secondary renovation of the original rooms. The later rebuilding parallels, in part, the construction sequence of Building 3 to the east (see Part VII).

The complex of rooms defined by Schmidt as Building 3 included a large central room, /16/, and several smaller adjacent rooms. Room /12/ is one of these smaller rooms and abutted room /16/ on the northwest. A test trench (fig. 5) through the final floor present in room /12/ showed that this room was older than Building 3 and had its original construction during phase D3. It was probably contemporaneous with room /1/, /3/, and /7/ to its north, as well as with the original construction of room /17/ and room /20/ of Building 2 on the west (fig. 1). Approximately 40 cm. of debris accumulated in this room before a second plaster floor was made. It is at this level, possibly D2 when correlated with baulks 1 and P (roughly 7.30 m. to its north), that the central room /16/ of Building 3 was constructed. The exterior facade of all four of the walls of room /16/ were niched. A major fire occurred, the burned rubble of which is clearly preserved in the section cut through the latest floor of room /12/. After the fire, the niches along the exterior walls of room /16/ were filled up and plastered over. New mud plastered floors were laid down within rooms /12/ and /16/ and the doorway between room /16/ and the east storeroom /19/ was blocked. Room /11/ belonged to this remodeling phase of Building 3. Room /11/ has yielded the radiocarbon date 3360-2995 B.C. (P-2708) slightly later than the dates from the rooms of phase D3. Finally room /16/ was rebuilt as /16/ with additional courses of brick laid upon the older walls as foundations.

To summarize, then, the central portion of the Main Mound consists of architecture defined by Schmidt as belonging to period «IIIB» but which typologically and chronometrically belongs to period

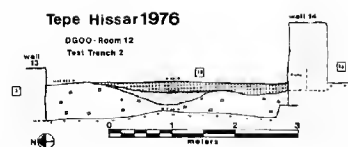


Fig. 5: Main Mound 1976: DG00 - Test Trench through Room 12, facing east

II. Within this complex a minimum of three depositional phases can be defined. Due to the nature of mound formation it is probable that portions of structures built in each of these phases were utilized simultaneously. D3 is the first of these phases and includes the construction of rooms /1/, /3/, /7/, and /12/ as well as room /17/ and room /20/ of Building 2. A second depositional phase, D2, can be correlated with the second floor of room /12/, the central room /16/ of Building 3, as well as its small storeroom /19/ to the east. Finally, perhaps during phase D1, room /16/ was rebuilt, its niches plastered over, new floors were built in room /12/ and /16/, and room /11/ was built on the east. This rebuilding could correspond with the remodelling of Building 2 to the west.

Building Stages C, B, and A

Above stage D, stage C is only represented by two walls in square CG 90, walls 40 and 41. The stratigraphic position of these C2 walls suggest that they could be contemporaneous with the final remodeling phase of Building 3, phase D1. Schmidt identified these walls as «falling between» his periods IIIB and IIC (1937: fig. 86) but it is likely they continue to represent period II in this area.

The area over Building 3 becomes a burial ground after D1. This burial episode is then followed by a series of structures, according to Schmidt's field notes. The remains of at least one of these buildings can be defined (see Part VII). Judging from Schmidt's published section (1937: fig. 85), this final architecture in squares DG 00 and DG 01 correlates with stage A (period III) as defined here.

The only evidence of stage A remains in the area of the Main Mound actually investigated during 1976 was wall 42 in baulk 1. The top of the P baulk, which relates stratigraphically to wall 42, produced a radiocarbon date of 2150-1885 B.C. (P-2620). Other stage A remains are still exposed to the south and west of this area but, as for the earliest periods, further field work will be necessary to properly describe these architectural levels.

ARCHITECTURE

As mentioned above, the architecture of the earliest periods which had been exposed in DF 09 had been removed. Thus the earliest horizontally exposed standing architecture present in this area was that in square CG 90, at the base of baulks 1 and P. This architecture corresponds to phase D3.

CG 90: Room /1/, areas /2/, /4/, /5/, and /6/

Room /1/ was a kitchen area enclosed by walls 1, 4 and 5 within CG 90 (fig. 1). The east wall of room

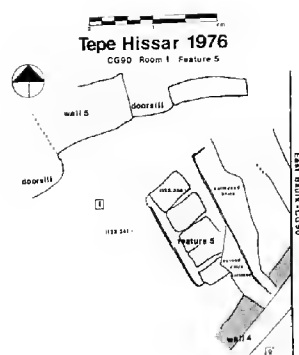


Fig. 6: Main Mound: 1976: CG90 Room 1/1, Plan of Feature 5

1/1 lay slightly beyond the limits of the excavation. Nevertheless, although the surface of the mound was eroded here, by brushing away the top soil the outline and direction of this easternmost wall could be traced.

There were two principal doorways in walls 1 and 5 which lead into room 1/1. These both had good plastered brick sills and measured 73 x 62 cm. and 77 x 66 cm. respectively. There were indications that the doorsill in wall 1 may have had steps leading up to it. A series of rectangular, shiny plastered bricks occurred at disturbed angles immediately below the sill. The floor beneath these bricks was very soft. Moreover, at the corner of the doorway, the plaster faces of walls 1 and 5 tended to curl up about 34 cm. below the level of the doorsill. The floor of room 1/1 was another 10 cm. below that. A third door may have been present at the east end of wall 5. Here the brick pattern was disrupted for about 64 cm. but no plastered doorsill was preserved here such as those present at the other two doors.

Against wall 1 was a double hearth alongside a bench which ran along the wall face. The northernmost of these hearths, feature 2, was the narrower of the two, and thick layers of plaster curved above it suggesting that it had probably been enclosed at the top. The second hearth, feature 1, was filled with charred ash and seeds. Immediately in front of the northern hearth and adjacent to it was a burned plastered platform, 13 cm. high, 64 cm. long, and 45 cm. wide (feature 4). The top of the platform was slightly depressed and fine white and gray ash occurred in the depression.

The two hearths had originally been one single long hearth measuring 95 x 55 cm. with a depth of 30 cm. Good plaster faces ran uninterrupted across the front and back walls of the two. When ash and silt had built up to a depth of 16 cm. from the bottom of the original hearth, a line of plaster was added to the top dividing it into two.

A plastered bench ran southward from the hearths along the length of wall 1. The bench was made of packed bricks and brick fragments with a thick coating of plaster along the front and presumably originally over the top. Both wall 4 and wall 1 had good plaster

faces on both their exterior and interior surfaces suggesting that they had been constructed first or, perhaps, were free-standing before the bench was put in against them.

A third feature of interest, feature 5, lay in the eastern portion of room 1/1 (fig. 6). It consisted of a platform made of 5 full sized bricks (60 x 30 x 9 cm.) within a half brick frame. Plaster ran along the front and the top of the brick platform. Directly behind this feature lay a collapsed wall. The bricks, as well as the plaster face, were badly burned. The southern end of the collapse ran up to the present northern face of the south wall of room 1/1, wall 4. At the time of the collapse wall 4 was only one course of bricks wide. During an earlier phase, wall 4 had a second course of bricks along its northern side. The fallen wall ran over the northern course indicating that this northern course was clearly out of use when the wall fell.

The entire floor of room 1/1 was covered by burned reeds, probably the collapsed roof. The sizes of the reeds varied yet they were seldom larger than 3 cm. in diameter. Below these reeds, on a floor with many layers of replastering, lay quantities of whole and partial vessels. About 17.94% of the sherds from this floor were from thin vessels with relatively large grit inclusions which were crudely finished and often charred («utility ware»). Another 18.58% of the assemblage consisted of pottery referred to here as «coarse ware». This pottery is often over 1 cm. thick, its paste ranges in color from buff to pink, it has no surface decoration and has large inclusions (lumps of clay and slag). 16.02% of the pottery was of the painted variety known from the 1937 site report and which predominate in the earlier periods at Hissar. Finally, the most common pottery type was grey (46.15%). Although the fabric of this grey pottery is similar to the very thin grey pottery known from the period III burials, most of these sherds are between 0.5 and 1 cm. thick and belong to vessels much more suited to domestic functions. No animal bones occurred within room 1/1 but 7 flint blades, a hammerstone (H76-26), a clay ball (H76-24), and a single large grinding stone (H76-131) lay among the pottery.

Room 1/1, or at least its eastern portion, showed evidence of at least two major fires. A first fire left traces which ran below the plastered bricks of feature 5 and up to the northernmost, earlier course of bricks of wall 4. A plaster surface was then laid on top of the burned surface. Feature 5 sat on the new surface which ran over the northernmost course of bricks of wall 5 and up to its present face. A second fire, presumably the one responsible for the roof collapse across room 1/1, then brought down the wall (which lay collapsed behind feature 5) and burned the top of feature 5 (fig. 6). This second fire could possibly correlate with the fire prior to the last rebuilding of room 1/2 suggesting contemporaneity. The charred roof remains dated the room to 3380-3155 B.C. (P-2709).

To the north of room 1/1 lie two outside areas, 5/ and 6/. Area 5/ was delimited on the south by a melted wall in baulk 5. This outside area is of particular interest. Its surface was very hard-packed, as though

a brick platform had been built but was not plastered. On this surface was a deposit of trash about 35 cm. thick. Here were found large quantities of animal bones, 2 bone awls (H76-N65, H76-N91), flint blades and chips (H76-43), a grinding stone fragment (H76-N48), a clay disk (H76-25), several broken animal figurines (H76-N30, N76-N29), as well as metal slag, an ingot (?) mold (H76-N28) and a shaft-hole axe mold (H76-N27) (see Part IV, fig. 5-7). The pottery consisted of 65.65% grey ware, 21.61% «coarse» ware, 4.24% thin-walled black charred «utility» pots and 8.28% of the painted pottery characteristic of the earlier periods.

To the east, area /5/ was separated from area /6/ by a long wall, wall 39, running into the north baulk of CG 90. This wall differed from other walls associated with phases D3 and D2 in that it had been constructed of packed mud (*çineh*) rather than of individual bricks. It consisted of very hard patches of brickly substance placed in vertical bands of irregular widths and containing very little straw. Wall 39 and wall 5, the northern wall of room /1/, delimited the outside area /6/ during the time of the occupation of room /1/. Area /6/ was excavated considerably below the level of room /1/ and a series of walls were exposed which belonged to an earlier building phase. The quantitative difference in the types of pottery present in level D and the earlier levels of /6/ is of interest. Grey pottery continues about the same, 44.47% of the earlier assemblage and 46.52% of the later one. «Utility» pots also remain about the same: 5.12% earlier and 3.43% later. The most marked changes are in the painted and «coarse» wares. The painted pottery decreases from 35.35% of the assemblage at the earlier levels to 18.20% during level D. «Coarse» increases from 14.80% to 31.57% as the painted is less frequent. This general pattern is found in all places where the 1976 excavation went below level D structures. The exposure of the earliest architecture of area /6/ was too small to gain a coherent picture of its features.

Area /2/ was an outside area which separated room /1/ from rooms /3/ and /7/. It was relatively clean of debris and had hard-packed mud surfaces. A single radiocarbon determination from immediately below the uppermost surface dates the area to 3380-3160 B.C. (P-2621), the same date which was obtained from within room /1/. Two test trenches into this area were used to determine the construction sequence among wall 1, 2 and 3 (fig. 7). The bricks of wall 1 began at a level about 15 cm. lower than did those of wall 3. Wall 3 abutted the walls of room /12/ and room /3/ which indicated that it had been built slightly later. While the bricks of wall 3 were very soft with a single, thin layer of plaster along the interior and exterior surfaces, the bricks measured between 55 cm. and 60 cm. in length, 25 cm. in width and 10 cm. in thickness. The bricks were rather soft and tended to crumble in comparison with the mortar which was a clean, very hard clay 3 to 4 cm. thick. A series of bricks laid in an irregular pattern of headers and stretchers was added at the southernmost end of wall 1. With these bricks wall 1 was extended 45 cm. to the south, beyond the corner at which walls 4 and 1 abutted. This wall

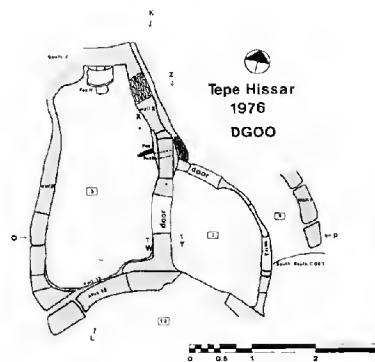


Fig. 7: Main Mound 1976: DG00 Plan of Rooms /3/ and /7/

extension ended just short of the southern baulk of CG 90 and separated the relatively clean deposit within area /2/ from area /9/, an outside area with layers of trash (sherds and a single clay ball with a perforation (H76-N32) but no animal bones) capped by lenses of wind and waterlaid silt, pebbles, and sand.

Walls 1 and 2 were built up on the same level (a fact confirmed by the C14 dates from rooms /1/ and /3/, as mentioned in the preceding discussion of stratigraphy. Wall 2 had a base running along its exterior face, 17 cm. above the floor. This was made of brick and projected 10 cm. from the face of the wall. It ran across a blocked doorway in wall 2 which led originally from area /2/ into room /3/. Plaster still covered the door jambs of the original doorway although it was blocked by bricks. The interior wall of room /3/ showed no traces of this doorway as it had been plastered smoothly across the length of wall 2.

Area /4/ lay to the north of area /2/. No wall separates these areas at this level. Area /4/ contained the remains of numerous burials which had not been completely excavated during 1931. A thin-walled burnished grey-black vessel (H76-32) and 2 fragments of alabaster (H76-N15, N76-N14) recovered in this area must have been associated with these intrusive burials. During stage D this area was an outside area. Amid the intrusive burials there occurred sherds (50.17% grey, 23.13% «coarse», 8.89% «utility», and 17.79% of the earlier painted variety), animal bones, and finally several fragments of clay objects such as animal figurines (H76-N18, H76-N21), jar seals (H76-N13, H76-N16), and a cone of clay (H76-N26).

Rooms /3/ and /7/: A Kiln

Room /3/ and /7/ were related and were of particular interest within this complex of buildings (fig. 7). Room /3/ measured approximately 3.60 x 1.60 m. This room was very badly burned, the plaster showing evidence of intense heat by its often unusual pink/purple color. The room was undoubtedly roofed as charred reed fragments occurred across the floor. The floor was plastered, and on it were whole pots and sherds (51.40% grey, 40.18% «coarse», 2.80% «utility», and 4.67% painted), very often fire blackened and stained, but no bones, flints or other artifacts.

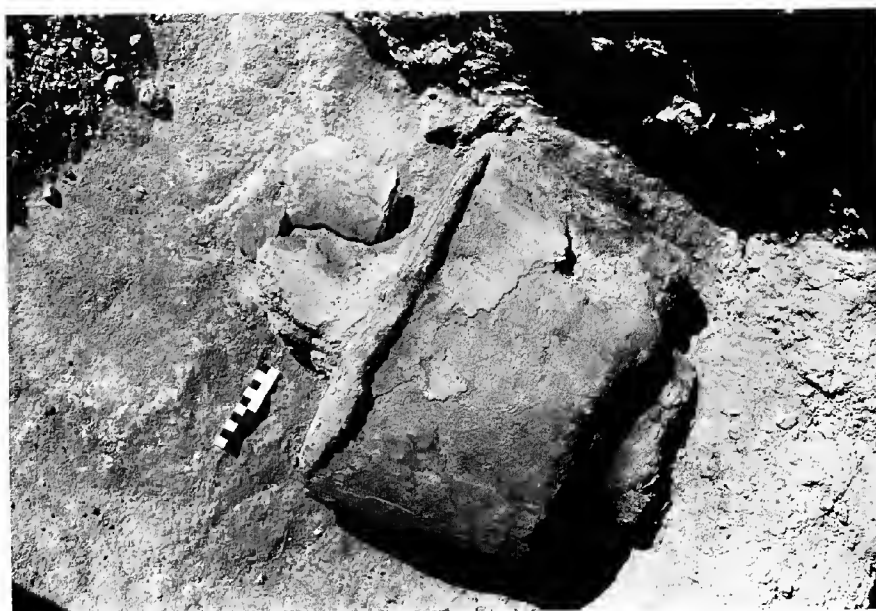


Fig. 8. Main Mound 1976: DG00 Room /3/, Feature 11

Two interesting features of this room identified it as a kiln. The first of these was a large ceramic chimney-like tube (feature 11: fig. 8). It lay where it had fallen, against the northern wall at the narrowest point of the room. The tube had a narrow circular opening measuring 20 cm. in diameter at the end and, in its central portion, was surrounded by a wider pottery tube measuring 40 cm. in diameter. It was fired to a whitish grey color and was extremely fragile, as the inner tube was only 15 to 18 cm. wide.

In the center of the east wall of this room, wall 2, were two related features, 7 and 9, which were also of special interest (fig. 9). Feature 7 was a rectangular niche and feature 9 is a circular opening next to the niche which opened to outside area /2/. Both of these openings were surrounded by a single thick plaster frame which protruded 7 cm. from the wall. There was also a thick plaster division between the two which ran down the wall and out 32 cm. along the floor towards the center of the room. Both the niche and the opening each measure 27 cm. across. A small black incised pot (H76-67) was placed into the plaster in the lower left hand corner of the circular opening.

On the exterior face of wall 2, the circular opening which functioned as a flue, to allow a draft to enter at floor level ended in a bin-like area cut within the base which ran along the bottom of the exterior wall 2 (fig. 10). The interior of this small bin-like opening has several layers of plaster, all burned to a bright red.

Large quantities of reeds, over 5 cm. in diameter appeared to have been piled up against the east and north wall of the room. The pile ran from features 7 and 9 northward along wall 2 and then continued along the north wall. The reeds were piled up between 10 and 15 cm. above the floor. They were all rather

large and appeared regularly placed, quite unlike the smaller and more variable burned reeds in the center of the room which were characteristic of roof collapse. These latter charred reeds dated the room to 3375-3150 B.C. (P-2707) and 3385-3165 B.C. (P-2711).

The doorsill between rooms /3/ and /7/ was also plastered. It was raised 80 cm. above the floor level and was 56 cm. wide (roughly one brick). Room /6/ abutted into room /3/ and its exterior wall, wall 3, was curved and constructed of narrow, very soft and sticky bricks (58 x 15 x 10 cm.). A second door leading from room /7/ into area /2/, was 52 cm. wide and also had a raised doorsill. The preserved doorway from room /7/ into room /12/ was used during a later period, presumably when room /3/ was no longer in use as the bottom of this doorway is 45 cm. above the floor of room /7/.

Room /7/ had been filled with bricks and brick fragments up to the level of the doorway to room /12/ and may have had a floor over it which has now disappeared, such a floor would have partially blocked the older door into room /3/. Charcoal from within this fill produced the date 3175-2920 B.C. (P-2710).

Under the bricky fill, resting on the floor of room /7/ was a plastered step or platform of 3 bricks (ca. 48 x 24 cm.) within a half-brick frame reminiscent of feature 5 in the eastern portion of room /1/. The platform, feature 8, was off-center within the room in relation to the walls and doorways and lay on broken sherds giving the impression of having fallen. The plastered surface over the bricks of the platform was burned.

The sherds on the lowest floor of room /7/ were few. Of 60 sherds which occurred on the floor, 23.33% were of grey thick-walled large vessels, 30% were

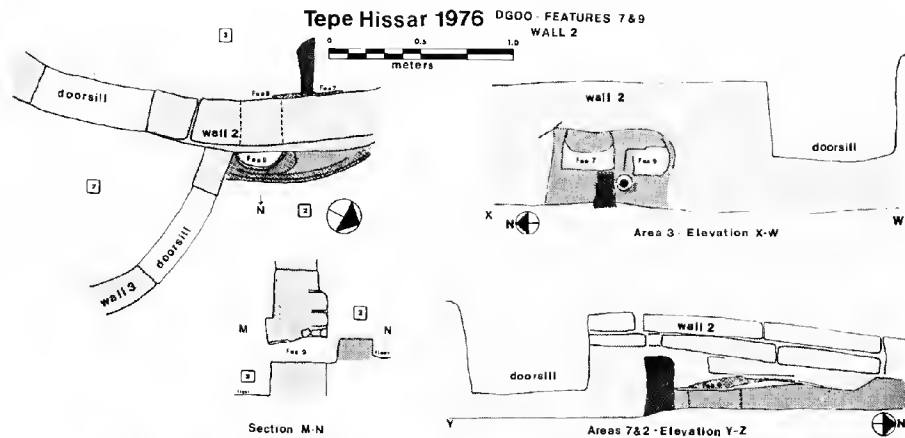


Fig. 9: Main Mound 1976: DG00 Plan, Section and Elevation of Features 7 and 9



Fig. 10: Main Mound 1976: DG00 Feature 9 from Area /2/, facing west

« coarse », 35% were « utility » and only 11.66% were painted sherds. A single clay bead was found in the fill (H76-42) and no animal bones.

The unusual features of room /3/ and the position of room /7/ in relation to room /3/ indicate a kiln area. The chimney, placed in the roof, or in the upper courses of the north wall of room /3/ and features 7 and 9 would have served as flues for damping the flow of air into the kiln when the door was closed. This would have provided rather precise control over the horizontal air flow into room /3/. The unusual pinkish-purple color of the burned plaster along the interior walls of this room indicates the very intense heat at the time of their burning.

Building 3 and storerooms /11/ and /12/

Rooms /11/ and /12/ represent rooms attached to the northern facade of the architectural complex labelled by Schmidt « Building 3 ». This building encompasses a central room, /16/, and various smaller rooms surrounding and associated with room /16/. It is clear that this complex, as it appears on the plans

was stratigraphically later than the complex of rooms of phase D3 just described, and belonged to a later construction phase, possibly D2 or D1.

A test trench through the final floor of room /12/ showed two earlier construction phases which could possibly have been contemporary, or only slightly later than the buildings to the north (phase D3) (fig. 5). A series of three floors were distinguishable.

The earliest floor, floor 1, lay 57 cm. below the final floor (floor 3) and was only a few centimeters above the floor of room /3/ to its north. This lowest floor of room /12/ appears to have had a door stud at its southeast end. Floor 2, 40 cm. above floor 1, was the one on which the central room /16/ of Building 3 was originally built. Room /16/ was built with a series of niches along its exterior walls, each measuring between 58 and 80 cm. in width and 30 cm. in depth. The building then burned down and the niches were filled with rubble. Following the burning, the niches and the rubble within them were plastered over, the final floor 3 of room /12/ was laid down, and the building was reused. Unfortunately room /12/ had

been excavated down to floor 3 (the final floor) during the 1930's so that no pottery remained. The 1976 test trench through floor 3 and down to floor 1 revealed pottery in the proportions of 33.52% grey, 2.84% « coarse », 10.22% « utility », 53.04% painted. These percentages are similar to those found elsewhere in levels earlier than those of phase D.

Wall 12 of room /3/ was built against wall 13 of room /12/. Wall 13 was 30 cm. wide, made of bricks with lengths varying between 44 and 64 cm, and widths between 20 and 30 cm. The northwest corner of the room was bonded. The east wall of room /12/, wall 9 was plastered inside and out and had bricks of lengths varying between 58 and 61 cm, by 30 and 10 cm. Wall 9 was abutted by walls both to the east and west. A small wall stub on the west was made of two rectangular bricks 46 x 24 cm, which framed the doorsill leading between rooms /12/ and /7/. Abutting to the east of the north end of wall 9 was wall 10. This wall of bricks 68 x 31 x 10 cm, laid in stretchers, enclosed room /11/ whose access to room /12/ was by a doorway 80 cm. wide with a plastered sill located at the south end of wall 9.

Room /11/ had not been excavated completely during the 1930's and proved to be a room which was very burned. It has produced a radiocarbon date of 3360-2995 B.C. (P-2708). The entire floor of the room was charred but evidence remained that it had been plastered. It was littered with fire-blackened sherds (37.85% grey, 30.84% « coarse », 9.34% « utility » and 21.49% painted) in a soft black ashy deposit on the floor. A few animal bones occurred but not other artifacts. The remains of three circular plaster bin-like structures, each of plaster only 2 cm. thick, are enigmatic. No sherds ran underneath these. They sat directly on the floor and measured 66.60 and 62 cm. in diameter. They were burned and the smoothness of their curve gave the impression of their perhaps having once held storage jars.

An intrusive burial, burial 6, occurred in the southeast end of the room. The body was carefully placed among a ring of bricks each of which measured 58 x 28 x 9 cm. The body was elaborately equipped with three thin-walled grey-black pottery vessels (H76-70, H76-71, H76-72), two coiled copper bracelets (H76-52, H76-53), a string of 48 beads, 43 of which were lapis, the rest crystal, carnelian and pottery (H76-54), what appeared to be a silver bracelet (H76-123) and the fragmentary remains of a textile which lay beneath the skeleton (H76-56-66) (see Part IX). This burial had cut into the eastern wall of room /11/ so that this wall was destroyed. The burial is clearly of a later date.

The eastern end of the northern wall 14 of room /16/ was cut through during the 1930's but the outline of the wall still remains on the surface. This wall was aligned with wall 22 to the east and contained the easternmost niche of wall 14.

As mentioned above, room /16/ appears to have been originally constructed during phase D2 as it occurs in baulks I and P roughly 7.50 m. to the north. After a fire, a new floor was plastered over 18 cm. above the original floor and the niches along the

exterior of the walls were plastered over. Later new courses of bricks were added to build a new structure on the old. The bricks used in the upper portions of the walls were 62 x 27 x 10 cm. and often contained painted sherds. At the lower levels, the bricks in the walls were slightly smaller, averaging about 50 cm. in length, although they were not uniform. The mortar contained some straw making it softer than that used in walls of building phase D3.

The east, north and south walls of room /16/ were each 60 cm. wide with exterior niches between 40 cm. and 65 cm. apart, each 30 cm. deep. The west wall, wall 19, was only 30 cm. wide and after the fire appeared to have replaced niched wall 20 further west. Wall 20 was 60 cm. wide and had four niches on its exterior, paralleling the four on the east wall, wall 17.

It is not clear how one entered this room during its final occupation. A doorway in the south wall, wall 16, was blocked. A « creephole » west of the doorway in wall 16 was only 53 cm. wide and leads into storeroom /18/ on the south (see Part VII). Finally, a doorway into room /19/ through east wall 17 was also blocked.

The interior of the walls and floor of this room were burned red. The floor features of the room had eroded by 1976 but Schmidt described them in the 1937 report (1937: 156-157). A rectangular platform lay in the center of the room oriented in the same direction as the walls. Schmidt records that it measured 90 cm. square and was 15 cm. high. A hole 80 cm. deep lay in the center and Schmidt estimates its original diameter at 25 cm. This feature clearly was not a central hearth such as those found in other buildings on the Main Mound or on the North Flat. Schmidt suggests that this may have been constructed to accommodate a central roof support (see Part VII).

Three mud-plastered terraced fireplaces lay against wall 17. The uppermost fireplace measured 32 cm. across and it rose 45 cm. above the floor. The other two were 10 cm. and 30 cm. respectively above the floor. Traces of a small bin were reported by Schmidt in the northwest corner of the room.

A small partition wall seems to have enclosed the southeast corner of the room. The floor was lower in this area and a small wall stub was delineated during the 1930's which protruded from wall 16 and screened the doorway in that wall.

Finally, the original interior south face of north wall 14 contained three-to-four rows of small sub-rectangular niches filled with ashy brickly fill and burned black around the edges (fig. 11). These were plastered over when the wall was re-used.

The east wall of storeroom /19/, to the east of room /16/ was cleaned and niches of the type found in walls 14, 20 and 17 were found along the exterior of this wall also. The only access to this room appears to have been through the doorway in wall 17. It was clear in CG90 to the north that the Main Mound sloped upward at this eastern edge. Architecture of building phase D3 (the east wall of room /1/) lay immediately below the surface east of CG90. Here, to the south, it would appear that storeroom /19/ was part of the original construction of Building 3, later blocked off



Fig. 11: Main Mound 1976: DG00/01 Building 3, Niches along Wall 14 of Room 16

when the building was renovated after the first fire. This would account for the presence of niches in its /19/ easternmost wall. A third indication of this configuration of the mound exists in the traces of plaster visible in the surface at the east end of wall 14. The base of the final niche and that wall appears to be above the present floor level. At the time of its initial construction, during phase D2, this eastern edge of the mound must have been slightly elevated.

Building 2

To the west of Building 3 Schmidt outlined a second building complex in the Main Mound, Building 2. This building can be stratigraphically related to Building 3 to the east by room /17/ which was adjacent to room /12/. The west wall of room /12/ and the east wall of room /17/ were built against each other. The floor of /17/ was slightly lower than the first, earliest floor of room /12/ but appeared contemporary with room /3/ to the north. It appeared that the earliest occupation of room /17/ was contemporaneous with building phase D3. As with Building 3, however, a second period of occupation was evidenced in the building. The plaster on the interior walls of both room /17/ and the central room of Building 2, room /20/, turned out about half way down the walls suggesting a later floor level which could have been roughly contemporaneous with the final occupation of Building 3.

The central room of Building 2, room /20/, was reminiscent of room /16/. Walls 27 and 28, the northeast and southeast walls respectively, were the best preserved of the four exterior walls of room /20/ and both are niched walls, 60 cm. wide, made of different length bricks laid irregularly in headers and stretchers. The niches, as those of room /16/ in Building 3, were each 30 cm. deep, varied in widths between 100 and 80 cm., and were located between 59 and 65 cm. apart. These niches were built in the original construction of the building, phase D3, and were plastered over during a secondary renovation, as were those of room /16/.

The northeast wall had no doorways but the southeast wall had a doorway with a stone door socket on the interior to pivot a door. Wall 32 was a short partition wall which screened the entrance. There may also have been a small «creephole» in the eastern end of the southeast wall (but see Part VII).

Area /21/ appears to have been part of the original construction as wall 31 which was 40 cm. wide was bonded into the northwest wall of room /20/. Although the south wall of area /21/ was eroded, a small wall stub on the east wall showed the location of a plaster sill and the end of wall 31.

The only feature reported by Schmidt within this room was the central hearth (1937: 156). It was disoriented with respect to the main axis of the room, unlike the column base in room /16/, and in this

Table 2
Occurrence of Pottery wares in CG90 - Building 3 area in Phase D

		Sherd Total	Grey Ware	Coarse Ware	Utility Ware	Painted Pottery
Pre-Phase D3						
CG90 /6/ Test Trench in outside area N of kitchen /1/		2127	44.47%	14.80%	5.12%	35.35%
Phase D3						
CG /6/ Outside area N of kitchen /1/		1137	46.52%	31.57%	3.43%	18.20%
CG90 /5/ Outside area NW of kitchen /1/		495	65.65%	21.61%	4.24%	8.28%
CG90 /4/ Outside area NW of kitchen /1/		281	50.17%	23.13%	8.89%	17.79%
CG90 /1/ Kitchen floor	3380-3155- B.C. (P 2709)	156	46.15%	18.58%	17.94%	16.02%
		108	43.51%	25.92%	4.62%	25.92%
CG90 /2/ Alley between kitchen /1/ and kiln /3/	3380-3160 B.C. (P 2621)					
DG00 /3/ Kiln floor	3375-3150 B.C. (P 2707)	107	51.40%	40.18%	2.80%	4.67%
	3355-3165 B.C. (P 2711)					
DG00 /12/ Floor 1		176	33.52%	2.84%	10.22%	53.40%
Phase D2						
Bldg 3 /16/ Main room						
Bldg 3 /12/ floor 2 & fill						
Room /7/ floor 2 & fill against kiln /3/ and room /12/	3175-2920 B.C. (P 2710)	60	23.33%	30.00%	35.0%	11.60%
Phase D1						
Bldg 3 /16/ Rebuilding						
Bldg 3 /12/ Floor 3						
Bldg 3 /11/ Floor	3360-2995 B.C. (P-2708)	214	37.85%	30.84%	9.34%	21.49%

manner paralleled the positioning of the hearth in the central room of the Burned Building in the North Flat.

Although the analysis of the pottery from the stage D structures on the Main Mound is not yet completed, a few general statements can be made on the character of the assemblage. A brief description has been given above of the three major wares which were present. In the D phases these wares occurred roughly in the proportion of 40% grey, 35% coarse and 25% (or less) painted (Table 2). In the few places where excavation penetrated below stage D architecture (area /5/ and a test trench to the north of room /11/) the proportions changed dramatically. Grey ware continued to make up 40% of the assemblage but the coarse ware was only 20% and the painted went up to 40%. The painted pottery which dominated the earlier periods is being replaced during stage D by the coarse ware. A glance at the pottery excavated from stages C, B, and A in baulk P showed that the painted pottery dramatically decreased after stage D to make up less than 10% of the assemblage. It is clear that stage D represented a transitional period and that the transition is quite abrupt. Understanding the nature of this transition must wait until specific information on the wares, shapes, and decoration of the pottery from the P baulk and the sounding in DF 09 are compared with those from the D phases.

Architectural remains of stages C, B, and A

Building stage C which corresponds to strata (3) and (4), has been defined by Schmidt as « walls which may belong to the slightly later building phase of level 2, or which may actually have been built during the occupation of level 1 ... » (Schmidt 1937: 155-156). The wall remains of this period are fragmentary. In the area investigated there were four small wall remains of this construction level. These were walls 40, 39,

43, and 41, located in baulks 2, 4, 5 and 8 of the 1976 excavation. Of these, the walls in baulks 2 and 8 (walls 40 and 41) seemed to belong exclusively to the level under consideration here. Baulks 4 and 5 contained walls 43 and 39 which began in stratum (7), phase D3. As the other walls discussed here these have also probably been rebuilt at least once.

Very little remained of wall 40 in baulk 2. Three courses of bricks in the easternmost section were still in position. These bricks measured 60 x 25 x 10 cm. As with the other walls of this building level it was no longer possible to say what this wall was associated with nor exactly in which direction it ran.











Wall 41 at the top of baulk 8 ran the length of this baulk and its bricks slid northward into baulks 4 and 5. A single course of bricks remained (52 x 25 x 10 cm.) into which a child burial had been cut.

Baulk 5 consisted of ill-defined melted bricks. The uppermost bricks, contemporary with wall 41 measured 52 x 28 x 12 cm. and were fairly uniform in size. The two top courses were well defined and below them ran skewed courses of melted bricks. These ran down to the floor in area /5/ which corresponded with phase D3, stratum (7), architecture exposed to the south in CG 90.

The top of baulk 4, at its southern end contained bricks at skewed angles which appeared to be the continuation of wall 41 in baulk 8, belonging to phase C2. These bricks were sliding northward.

The architecture of the last occupations, levels A and B, was still visible in the western and southern portions of the Main Mound (see Part VII). During 1976, however, attention was focused on the east and central portions where excavations in 1931 had removed the uppermost architecture. In his field notes (1932), Schmidt states that the uppermost walls were low and hardly defined and that the level was sterile

Key To Architectural Plans

	Blocked Door		Pot
	Mud Wall (Brick)		Area No.
	Bench		Wall No.
	Hearth		Down
	Plaster		Elevation (m) Above Sea Level

Key To Archaeological Sections

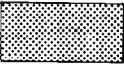













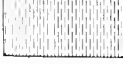
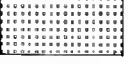
	Loose fill		Compact occupational trash
	Compact fill		Bricks and walls
	Loose bricky fill		Brick bats
	Compact bricky fill		Solid brick masonry
	Gravel		Striated ash
	Loose wash and gravel		Heavy burn
	Layered wash, clay		Plaster
	Loose occupational trash		Animal holes

Fig. 12: Main Mound 1976: Key to Plans and Sections

except for numerous burials. Schmidt attributed the lack of coherent building plans in this level to erosion caused by their proximity to the surface (1937: 155).

The only architectural feature investigated during 1976 which was clearly associated with stages B or C was a series of 3 ovens/hearths in square DG 20. Schmidt dated these features to period III. These ovens were fire burned and a radiocarbon sample was obtained during the 1976 season, giving a date of 2640-2390 B.C. (P-2618). The form of these ovens, small rectangular firing chambers with a central column is recorded also in the Burned Building of the North Flat.

One wall which clearly belonged to the uppermost stratum was wall 42 in CG 90 which sat at the top of baulk 1. Four courses of bricks were preserved in this wall which ran over 5 m. across CG 90 in a north-south direction. The bricks were rectangular in size and measured between 54 and 48 cm. in length, 25 cm. in width and 10 m. in thickness. As mentioned above, this wall can be dated by association with the uppermost levels of the «P» baulk which produced a date of 2150-1885 B.C. (P-2620).

CONCLUSIONS

The depositional history of the Main Mound at Tappeh Hesar has been described as it was interpreted during the 1976 field season from a series of linked baulks which were left exposed during the 1932 excavations in this area. Building stages and depositional phases were labelled by an arbitrary system of capital letters and numbers for the purpose of ordering the description of the architectural sequence. Schmidt's periods, Hesar III, II and I are too gross to be able to encompass the complexity present.

With these levels as a framework, the exposed architecture of the eastern portion of the Main Mound was investigated such that the construction features

and plans of these rooms could be understood as well as their chronological relationships.

Research paralleling that carried out on the Main Mound was conducted on the North Flat and on the South Hill. Here too a series of connected baulks were cleaned and drawn and the relationship of the baulks to the exposed architecture was recorded (see sections V and VII). When all pottery, soil, seeds, radiocarbon, and metallurgical debris has been analyzed, the combined occupational history of these areas will provide a substantial outline of the sequence of occupations at Tappeh Hesar.

It is clear from the preliminary description offered here that the buildings on the Main Mound were quite sophisticated, well constructed structures. Plans published in 1937 show irregularly shaped walls running in odd directions and often not forming proper enclosures. Cleaning of these walls has shown that this was not the case. Very elegant, well planned buildings, such as the niched buildings, lie alongside smaller rooms, each with carefully plastered walls and floors and containing well planned features with indicate cooking, baking, firing, and storing functions. This area was a major residential area of considerable size and importance.

The brief two pages of description of the architecture of the Main Mound in Schmidt's final report (1937:155-157) is unsatisfactory in light of the complexity of the architecture and inadequate for a proper interpretation of this area of the mound. It is hoped, therefore, that this preliminary report will, when integrated with other research carried out during the 1976 season, contribute to a better understanding of the occupations on the mound of Hesar during the Bronze Age. This in turn will be an invaluable contribution to our assessment of the culture history of northern and eastern Iran during prehistoric times.

VII. OBSERVATIONS ON ARCHITECTURE AND STRATIGRAPHY AT TAPPEH HESĀR

Robert H. Dyson, Jr. and William C.S. Remsen

The major interpretive problem facing the restudy project, which is a fundamental one for prehistorians generally, is the question of the manner in which cultural change has taken place as seen archaeologically, and at what rate. The field data reflect changes in economic conditions, in social organization, in technological development, and in foreign contacts. Such changes may or may not take place in these various aspects of culture simultaneously. A first task, therefore, is to describe and analyse the evidence for each category in its own terms; a second, is to integrate these separate descriptions into a synthesis for the settlement as a whole; and finally, there is the need to place this integrated view of development in a wider regional context as well as to relate it to relevant theoretical issues.

At Hesār the major emphasis of the 1931-32 program became the recovery and presentation of mortuary evidence from the many graves encountered in excavation. This emphasis, brought about by the sheer quantity of grave material, led in both the field recording and in the final publication to a neglect of other data such as the detailed analysis of stratigraphy and architecture, sherd assemblages, and artifacts in associated contexts. It also led to the neglect of other whole categories of evidence such as mineral slag, animal bones, plant remains, and so on. Yet all of these data are necessary to a full reconstruction of the cultural life of the inhabitants. We, therefore, turned part of our field effort in 1976 toward these categories in relation to the stratigraphic and architectural aspects of the site. It was our aim to enlarge and correct the body of descriptive data available, and to salvage some of the remaining evidence relating to the cultural and chronological problems raised by ourselves and other scholars.

The extensive excavations of 1931-32 laid bare a very large area of the site dating to various periods (fig. 2). In spite of the lapse of forty-four years, the relatively dry climate has preserved many features of the excavated remains, so that an experienced observer can still establish many points of reference to the original conditions. With judicious cleaning and measuring, and a review of the available archival records, some progress has been made toward redescribing and correcting the interpretation of what has been found so far. Needless to say, much work still needs to be done, both in the field and on the archives, before a full account can be given.

Although a written description of the excavations on a daily basis is almost nonexistent for the 1931-32

field seasons, nevertheless, in the preserved archives an almost hidden structure of general sequence lies concealed. Work was carried out and recorded by individually designated squares. Furthermore, finds and depths of excavation were recorded on a daily basis. The artifacts found were recorded in a field catalogue with sequential H numbers for the two seasons in order of the days on which items were found. This listing groups the objects in order as the work proceeded. Since many entries were annotated with the depth at which they were found, it is possible from this catalogue to indicate for certain days the depth reached by the excavation. For 1931 there also exists a much damaged architect's Daily log and some separate notes which generally record the depth dug each day in the square being excavated and some of the features found. Thus, the two items together provide a rough framework for relating objects, depths and days. To this evidence it is then possible in many instances to compare directly field photographs and the published sections which record datum, surface, depths of walls, individual burials, and the base of excavation. Since the sections are drawn to scale it is possible to project gross depths for various features which may then be compared to the catalogue information. These data may then be related in many instances to new observations made in the field. The resulting reconstruction, where it is possible, allows the use of the architectural remains to order groups of objects in the strata above and below, and on floors. It also makes possible the relative positioning of burials grouped at different depths. This method of review is not an adequate replacement for careful stratigraphic excavation, but it at least allows some order to be introduced into material which has been assigned typologically to a chronological sequence based on grave contents.

This reconsideration is made necessary by virtue of the fact that many attributions of individual objects to various periods are not only uncertain but, in terms of stratigraphic context are demonstrably wrong. This problem of dating arises especially for periods of transition when attributes assumed to be characteristic of one period occur alone or mixed with attributes assumed for the following period. In the absence of any quantitative information on how many attributes are changing and at what speed it is impossible realistically to assign them to one period rather than another. Hence the inconsistency and confusion in the record over the identity of objects in Schmidt's periods «IIA» and «IIIA».

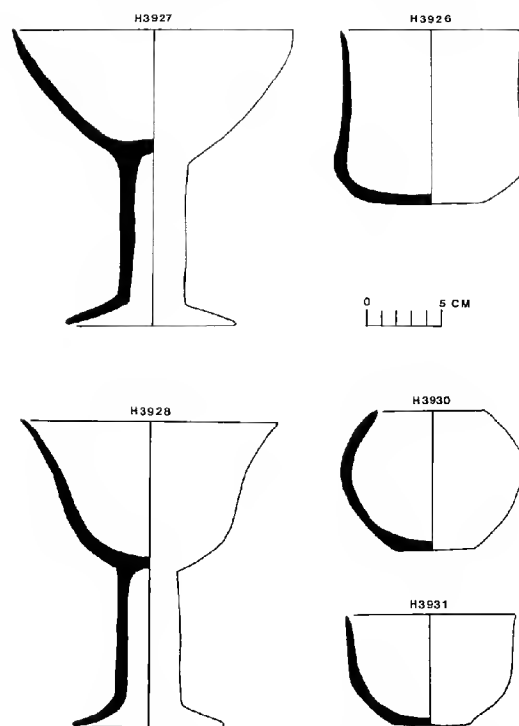


Fig. 1: Main Mound, 1932: Pottery from Building 1, and below (H3927-28)

Schmidt's criteria for the establishment of these two periods, «IIA» and «IIIA», were strictly typological. Graves containing painted pottery along with types assigned to period «II» (characterized by stemmed bowls) were assigned to an overlapping transition from the painted pottery graves of period «I» (Schmidt 1937: 108). The painted ware of «IIA» was described as being characterized by extreme conventionalization of gazelle patterns, the disintegration of feline patterns, and the disappearance of birds and ibexes. Although the wheel was introduced in period «IC» Schmidt comments in relation to the painted ware of «IIA»: «at times we could distinguish potsherds only by means of the wheelmarks present on the Hissar IIA wares» (*ibid.*: 108). On the other hand, in dealing with the grey pottery, Schmidt states that he assigned *only* those grey vessels found in graves with the painted pottery to this period (*ibid.*: 112). In connection with period «IIB» he comments: «However, rather clumsily decorated vessels and sherds still occur sporadically in the principal sub-layer (IIB) of Hissar II» (*ibid.*: 114) and further: «As in all other sub-layers of the strata, there are earlier and later types which in many cases cannot be defined as such. As a matter of fact, mistakes in attributing finds to one or another sub-layer /i.e., period/ are apt to occur» (*ibid.*: 114). The latter comment shows that items were assigned by type rather than by context. In relation to identifying «IIB» graves as distinct from those of «IIA» Schmidt remarks: «It

would hardly be possible to distinguish the gray vessels of Hissar IIA and IIB were it not for the association of late painted vessels with the early gray pots of Hissar II. At the present state of knowledge we are not able to say that the gray vessels of Hissar IIB which are illustrated, might not also occur in Hissar IIA and vice versa» (*ibid.*: 116). The operational definition of «IIA» and «IIB» was based on 209 graves of which 91 were assigned to «IIA», 87 assigned to «IIB», and 31 attributed only to «II» as it was impossible to be more specific.

A similar difficulty was encountered in trying to specify materials belonging to period «IIIA» which was defined as a «buffer zone» to accommodate the transition from period «IIB» to «III» (*ibid.*: 155). The period was defined as «Part of the house remains, as well as certain graves and their equipment, /which/ might have been attributed to Hissar II or III respectively» (*ibid.*). «In terms of space, it is a layer deposited during that /transition/ phase and containing material with both Hissar II and III characteristics». «In several instances, we are sure, individual objects and even entire graves of Hissar IIB or Hissar IIIB were attributed to this transitional layer, due to find conditions» (*ibid.*: 178). In «IIIA» Schmidt comments that stemmed vessels occur along with surviving painted vessels and that the bottle-pitcher (a type characteristic of «IIB») appears. The basic difference between periods «II» and «III» is based on a change in characteristic types.

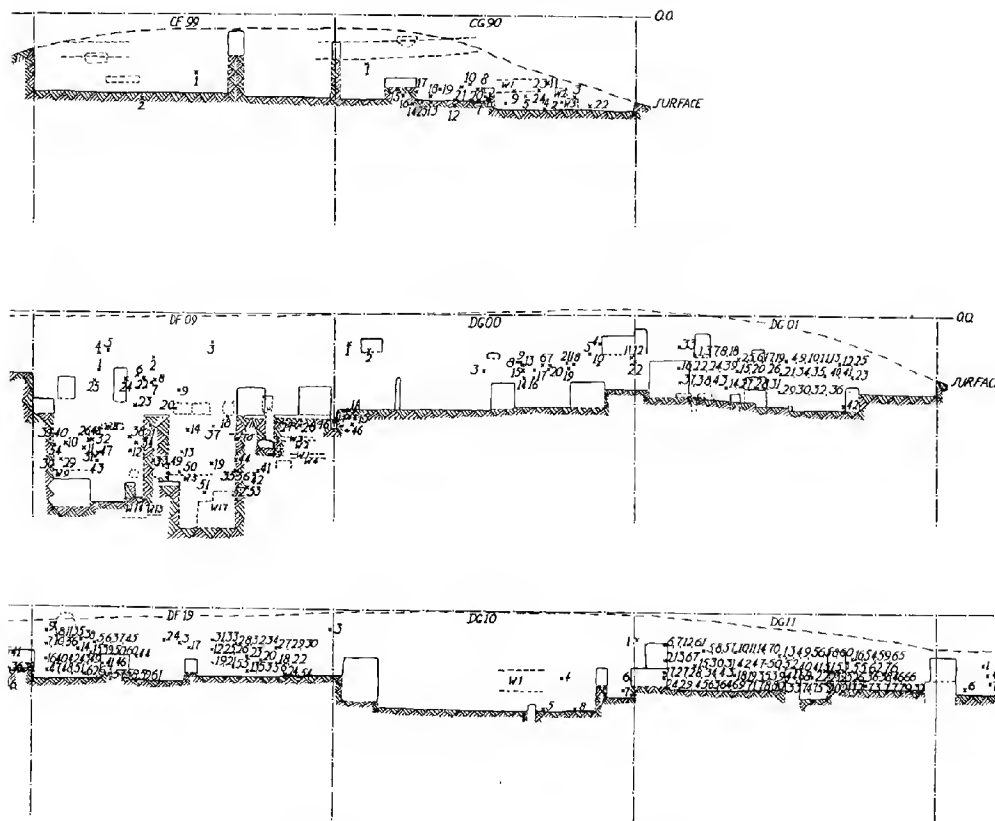


Fig. 2: Main Mound, 1932: Sections (Schmidt 1937: fig. 85)

«The stemmed vessel disappears, except for braziers, and new shapes define the last ceramic epoch of Tepe Hissar. Bottle-pitchers, graceful vase-cups, and toward the end, attractive canteens are the principal forms of Hissar III» (*ibid.*: 178). Spouted bowls are also mentioned as typical of «HIB». Period «HIC» is defined by the appearance of oval, oblong, or globular canteens (bottle-pitchers with paired suspension lugs at either side of the base of the neck) and the popularity of pattern-burnishing as a decorative technique. Alabaster/calcite vessels are also a new addition, replacing the stemmed pottery forms in stone (*ibid.*: 181).

In making these assessments Schmidt has used a «type-fossil» approach without regard to quantitative information (essential in view of his feeling that period «II» «faded» into period «III» (*ibid.*: 306) or stratigraphic associations. Objects are dealt with individually without regard to depth of discovery or relationship to soil deposits or architectural remains. Thus material which is so deep and so sealed over that it can only belong to period «I», for example, has nevertheless been assigned typologically to periods «I», «II» and even «III». There are, therefore, many methodological problems in the seriation of the graves themselves. The correlation of objects found in habitation levels is even more difficult since the defining

criteria of associated types is usually missing as reported in the publication. Attribution to «period» in such instances is based purely on the form of the individual vessel.

In addition to the difficulties inherent in the definition of the grave sequence itself, the neglect of stratigraphic sequence and artifact association leads to a confusion in the relationship of the habitation levels to the ceramic sequence based on the graves. This confusion is not due to any lack of concern for stratigraphic sequence on the part of Schmidt. Indeed, he is very specific about his interest in developing just that evidence (1933: 333 ff.). But in doing so he began to use the term «level 1» and «level 2» in each square to refer to the building levels encountered. In the absence of measured sections this nomenclature was inadequate to deal with the complexities of mound formation and encouraged a simplistic notion of general «levels» covering whole areas which could be correlated horizontally by depth. The published «sections» are abstractions providing approximate depths and heights of wall remains and positions of burials (fig. 2). A comparison with a measured section shows at once the actual complexity involved in attempting such correlations (cf Part VI). This «level» approach was combined with the assumption that all burials

were made below the habitations of the dead, and that the overlying levels should be dated by the contents of the graves below, introducing a vertical confusion to the horizontal. The result was in effect, to ignore the rhythm of occupation of the site in which occupied areas alternated with abandoned areas used for burial grounds. Schmidt recognized this fact in the abstract: «The dead of Hissar II, like those of Hissar I and III, were deposited in the inhabited, or in the temporarily deserted, areas of the mound» (1937: 127). Yet elsewhere (1937: 26) Schmidt comments: «...the belongings of those persons formerly living in the upper settlement had been given to the dead, whose graves extended, of course, into level 2. Needless to say, the same phenomenon was encountered at all levels, and often a level was dated, relatively, by the contents of the graves in the level below». Thus, the complexity of the architectural and stratigraphic remains was vastly oversimplified and the dating assigned to the remains made problematical. In most areas it can be seen that the graves were dug into the ruins of abandoned houses and trash and not under the floors of existing structures. The resulting cemetery area was then later built over again. As a result, there is usually a gap of undefined duration between the period of the graves and that of the underlying and overlying buildings. Since it may be seen that individual structures grew by accretion and renovation, rather than by any wholesale leveling and reconstruction of the town, efforts to assign dates to specific deposits must be made on a local basis rather than generally.

Another aspect of misinterpretation is found in the violence done to the architect's original plans in the final publication. This distortion may be seen by comparing his original drawings (e.g. Schmidt 1937: fig. 22 or 23) with Schmidt's blackened copies in which he assigns walls to specific «levels» or periods (*ibid.*: fig. 24 or 25). On the original plan there are many lines indicating details such as abutments, overlaps, etc., which have architectural and temporal significance. A comparison of these plans shows that in preparing the publication Schmidt misread the evidence and made structures look more complete than they really were. An examination of the sections in relation to the plans shows that some of the walls treated as contemporary could not have been so. Furthermore, examination in the field shows that, while not explained, every line drawn by the architect was significant in some way. Unfortunately, both the drawing of walls and their excavation was poorly done. Consequently, they appear as if badly constructed in a highly irregular fashion. Such is not the case when properly cleaned and recorded in the field: Given a work force of some two hundred, overseen by only five or six recording staff, it is surprising that the excavators did as well as they did. When examined in the field in 1976 most of the walls drawn as very wide on the plans were found to be, in fact, double walls. Bonded corners and abutments were often not indicated on the plans, and few if any details of the masonry style appear. As a result, the variety of accomplishments of the Hesār builders is not apparent. Their buildings are not haphazardly built village houses. The masonry of

period «II» as we shall demonstrate was well done according to established canons of construction. Carey (1937) criticised the published report for its blurred plans. It should be noted that these blurred plans are the ones reproduced by Schmidt for his period designations and not the original ones by the architect which are quite clear in the publication.

The 1976 work on the Main Mound, as already indicated (see Part VI), included the restudy of three major buildings (1, 2 and 3) each with several building stages. A fourth building was restudied on South Hill in DG 61 (fig. 7). Since these buildings can now be related to a controlled sequence using stratigraphic tracing and radiocarbon dating (see Part VI), these remains have now become useful for establishing relative artifact and burial positions and for architectural comparisons elsewhere on the site. Of special interest is the identification of a buttressed facade style which occurs on the Main Mound, the North Flat, the South Hill, and the Painted Pottery Flat. This style of facade, built with a standardized masonry technique, provides important evidence relating to the question of architectural innovation in relation to ceramic technological and stylistic change at Hesār. It thus sheds additional light on the long-standing question of the nature of the transition from the painted pottery period to that of the grey ware.

Main Mound: Phases D3, D2, and D1

Although Susan Howard has already provided a general description of the individual buildings in the Main Mound sequence (see Part VI) some additional and independent observations may be in order in connection with the concerns just mentioned. The upper stages of Buildings 2 and 3 are poorly preserved due to exposure. Their surrounding context was removed in 1931-32, so that their plan is certain only to the degree that they were founded on earlier stages. In Schmidt's published plan (1937: fig. 86) remains from several stages are plotted on the same plan making it difficult to read. The remains are assigned to periods but without benefit of stratigraphic control. In the case of Building 1 nothing now remains except for the line of foundations upon which the walls stood. These foundations may have been a separate structure of earlier date and are assigned to Phase E on our revised plan on the basis of their preserved height which ends at the floor level of Building 2 (VI: fig. 1). They have not been investigated, however, and it is possible that they should be assigned to Phase D along with the superstructure which once stood on them (Building 1). In the case of the other buildings the enigmatic plan of 1937 has been redrawn in the field in 1976 clarifying relationships and identifying certain wavy lines as buttressed facades (VI: fig. 1). By tracing floors and deposits along un-excavated baulks, it has been possible to assign building stages to Phase D3, Phase D2, and Phase D1 as defined in the major section of DF09-CG 90 (VI: fig. 3).

DF 09 Building 1 (Phase D3)

If the existing foundations (1-sub) represent the remains of an earlier building they should be assigned to Phase E (VI: fig. 4). The structure which reused them

TABLE 1: GENERAL CORRELATIONS OF MAIN MOUND BUILDING STAGES

Building 1	Building 2	Building 3	C14 Dates Phase B		Schmidt Date	Corrected Date
				2640-2390	B.C.	« IIC » III B
		3 ₁	Phase C			
	2 ₁	3a	Phase D1	3360-2995	B.C.	« IIB » « IIB » II
	2/2a	3	Phase D2	3175-2920	B.C.	« IIB » II
			Phase D3	3355-3165 3375-3150 3380-3160	B.C. B.C. B.C.	« IIB » « IIB » II
I-sub?			Phase E			

TABLE 2: STRATIGRAPHY AND ARTIFACTS: BUILDING 1

SCHMIDT:	STRATIGRAPHY:	ARTIFACTS:
« level 1 » « IIC »	Surface fill, no walls	
	-2.40 m	
« level 2 » « IIB » some maybe « IIA »	fill: Bldg 1 Phase D3 3380-3160 B.C.	(cf. H3987) pattern-burnished grey pottery bottle-jar (cf. H4275) grey pottery bowl with flat base and straight flaring sides H3927 stemmed grey pottery bowl, d. 19, h. 19.7 cm, « IIB » H3928 stemmed grey pottery bowl, d. 17.6, h. 20.5, « IIB » H3930 globular grey pottery cup, d. 8.1, h. 9.4, « IIA? » H3931 smooth grey/brown bowl, d. 10.8, h. 7.1, « ? » H3926 burnished grey/brown beaker/cup, d. 12.2, h. 11.5, « IIA? »
	-3.40 m	
	Bldg 1-sub Phase E???	

(if that is the case), however, belongs to Phase D3 along with Building 2 (DG 00/01). The floors of the rooms of this structure (Bldg. 1) were removed by Schmidt in order to penetrate into the painted pottery deposits further down. This deep test was the farthest down into the mound that Schmidt reached but even here the excavation never reached virgin soil. The floor itself lay at -3.40 m below 00 datum (the surface of this square). In 1976 time did not permit cleaning of the brickwork of the remaining foundations. Information on bonding, abutments, wall widths, brick sizes, and masonry style is, therefore, lacking at the moment. Consequently, it is impossible to know whether the plan represents a major central room surrounded by storeroom additions as in Building 3 and 4, or a set of rooms built as a unit all at once (VI: fig. 1). Presumably the walls were not buttressed, as the section indicates that they stood about a meter high and such a feature was normally indicated when detected during excavation. The section (fig. 2) does show, however, that the walls of the small rooms on the east side of the structure had unusually thick walls standing somewhat higher than the walls on the west. Such thick walls usually indicate double walls elsewhere on the original plans where we have been able to check them. If true, double walls would suggest that Building 1 actually consisted of the main room, the passageway off the north corner of the room, the square storage room just west of the passageway and a storeroom on the south west (VI: fig. 1). It is apparent that Building 1, unlike Building 2, was not rebuilt at a higher level since the

section and plan show that other walls occupied part of the square to the west at that time (Schmidt 1937: figs. 84 and 85).

The central room was the largest one and measured about 5.10 m northeast-southwest, and 3.90 m northwest-southeast along the major axes, with an area of roughly 20 m² (measurements are approximations in this case as they are taken only from Schmidt's plans). The building was oriented, like Buildings 2 and 3, with its major axes northeast-southwest and northwest-southeast. A door, 60 cm wide, led through the southwest wall to a storeroom. Partial preservation of the north and south walls would indicate a room with minimum dimensions of 3.0 m, or 9 m² in area. Inside this room, on the floor to the north side of the door, lay a globular storage jar with the rim broken off. The jar was discarded by the excavators but was described as being of a yellow/brown coarse pottery. The floor of this room was -3.30 m below the surface of the square.

A second door, 1.30 m wide, led from the central room to the south. This was probably the main door, given its width and the fact that it faced away from the prevailing wind as do the main doors of the other buildings studied. The door led to a narrow space behind the north wall of the central room of Building 2 (the floor of which lay about 20 cm higher). At the eastern end of this space another door opened into the northeast storeroom of Building 2 (see below). On the western end of the space a secondary wall ran between the two buildings and abutted the Building 1 doorway.

slightly over-lapping its opening. This fact, and the higher floor level, suggests that Building 2 may have been of slightly later date than Building 1. It is possible that the two buildings were joined through this enclosed space, 2.5 by 3.5 m (8.8 m²), making a « double house ». Similar arrangements occur today in Iran where brothers and their families live side by side in traditional villages. Further cleaning of the extant brickwork might help to clarify the history of this connection.

On the floor of the connecting area was found a burnished grey/brown beaker (H 3926; fig. 1) which may be compared to Schmidt 1937: Pl. XXXVIII, H 3967, « IIB ». In the fill a meter higher and, therefore, above the top of the ruined structure (fig. 2) were found two pottery vessels, both of which were discarded. One was a fragment of a flat-based grey pottery bowl with flaring sides (cf. H 4275, « IIIA », Schmidt 1937: Pl. XXXVI). Near it was the other vessel, a bottle-jar with the rim broken off. It was of grey pottery with an over-all design of pattern-burnished criss-crossed diagonal lines (cf. H 3987, « IIB », Schmidt 1937: Pl. XXXVII).

To the east of the main room lay two small storage cubicles with no preserved floors or features recorded. It is possible they represented later external additions against the side of Building 1. Together they formed a unit 2.5 by 3.5 m, or an area of less than 8.8 m² (omitting the dividing wall). They form irregular quadrilateral plans.

In the main room in the northwest corner was a door 80 cm wide with a small jamb on the east side and a sill 20 cm high. This door lead into the narrow passageway area which was 1.0 m wide at the south end and 2.5 m long. Schmidt refers to a nicely made niche, 50 cm high, 27 cm wide, and 19 cm deep at the side of this door but it is nowhere located on the plans (Schmidt 1937: 156). The function of the passage-like space is problematical but it may have been similar to area /21/ in Building 2 (see below). A northwest storeroom, with no preserved door ways, measured approximately 3 m by 3 m or 9 m².

The over-all scale of the structure can only be guessed at. The main room, 20 m², with the passageway, 2.5 m², and what appears to be a storeroom on the northwest next to the passageway, 9 m², plus a storeroom on the southwest, at least 8 m², would give an estimated minimum total area of 40.5+ m². If the two small storerooms on the northeast side area added (8.8 m²), the total would be 49.3 +m².

The central room of Building 1 was equipped only with a « fireplace » consisting of three elements set against the east side wall to the right of the main doorway (cf. Building 3). This « fireplace » consisted of two bins, set side by side, which projected 60 cm into the room from the wall. In front, two 30 cm long bricks (probably half bricks) were set on edge parallel to each other making a third « bin ». The arrangement recalls the three-part « fireplace » of room /1/ in CG 90 (see Part VI), although the details differ. The three « bins » in that case resulted from later additions and did not represent an original structure. It is possible that the three « bin » units in both Buildings 1 and 3 also resulted from reconstructions, but without more

detail available one cannot say. The walls of the central room of Building 1 were coated with 1.5 cm of mud plaster made up of many coats - a fact which reflects long use.

Two vessels (fig. 1) are recorded from « Level 2, low » (i.e. near floor level of Building 1) with no further location indicated. One is a flat-based hemispherical bowl (H 3930) while the other is a flat-based bowl with straight sides which curve in toward the base (H 3931). The former may be compared to an almost identical bowl from « IIA » (Schmidt 1937: Pl. XXIII, H 4361). H 3930 is described as grey and noted as « IIIA » in the Field Catalogue, while H 3931 is described as smooth and grey/brown with a « ? » for the period. Under the floor of Building 1, in « level 3 » were found two burnished grey stemmed bowls (H 3927 and H 3928). The two vessels (fig. 1) are said to be wheelmade and may be compared to H 4161 and H 5056 respectively (Schmidt 1937: Pls. XXVI and XXV, « IIB »).

Finally, it may be noted that the section (fig. 2) shows that Building 1 was built over an area used previously as a burial ground. Following the decay of Building 1, and of the walls built over it to the west, the area was again used for a burial area.

DF 09/10, DG 00/01: Building 2 (Phase D3/D2) and 2i (Phase D2/D1)

Immediately to the southeast, adjoining Building 1, lay Building 2 with a floor level 20 cm higher (VI: fig. 1). Building 2 had the same northwest-southeast axis as Building 1 and 3 and Structure /17/. The center of the main room of Building 2, area /20/, falls at the intersection of squares DF 09/10 and DG 00/01.

Building 2 was also assigned to Phase D3 in the new sequence of the Main Mound (Part VI) and was contemporary with Building 1 as well as with various structures to the northeast (VI: fig. 1). Excavation stopped in 1932 when the floor level as reached at - 3.20/3.10 m below 00 datum (fig. 2). In 1976 limited cleaning of brick-work in various walls was undertaken but time did not permit the articulation of masonry in the foundation of the north wall of room /20/ nor of the confused face of the northern half of the south west wall of that room. Examination of a field photograph from 1932 did, however, establish the fact that there had been a door in the north (rear) wall of room /20/ leading into the northeast store-room. This door has been indicated on the revised plan (VI: fig. 1).

The cleaning process revealed that, contrary to the published plan (drawn at a higher and later stage of the structure) Building 2 had a carefully constructed buttressed facade along the southeastern and northeastern exterior walls (VI: fig. 1). The over-all plan as presently visible comprises a main central room, /20/, entered from an open outside area on the south with a narrow passage-like area, /21/, along the northeast wall inside room /20/. This passage leads to a small room at the northeast corner which abuts or adjoins Building 1. A small door in the northwest wall of this room opens into the space between Building 1 and 2 behind the back door of room /20/. A brief examination in the field failed to reveal any doorway in the southwest

TABLE 3: STRATIGRAPHY AND ARTIFACTS: BUILDING 2

SCHMIDT:	STRATIGRAPHY:	ARTIFACTS:
«level 1» originally sherds called «IIB» Published using graves as «IIC»	Surface Fill: «grey ware sherds»	
«level 2» originally sherds called «IIA» Published as «IIB»	-1.80 m Fill: Bldg 2, Phase D2 into D1 3175-2920 B.C. «nearly all grey sherds, some red/black»	H 83, 97, 117, 123 clay quadruped figurines H 118 clay ball counter H 119 biconical sling pellet, clay H 120 clay ellipse counter
	-2.50 m	
	floor:	H 56 painted round based cup, d., h. 8.8, «III» H 116 cylinder seal (Schmidt 1937: fig. 118) H 2352 stemmed grey pottery bowl, d. 8.8, h. 10, «IIIA»
	Fill: Bldg 2/2a Phase D3 3380-3160 B.C.	H 126 clay biconical sling pellet H 200-202, 204, 208 clay quadruped figurines H 203 miniature bowl, d. 3.9, h. 1.2 H 205 miniature jar, d. 3.4, h. 2.4 H 206 clay biconical sling pellet H 209 pottery whorl
	-3.20/3.45 m	
	floor:	H 127-129 clay quadruped figurines H 130 clay ball counter H 131 pottery whorl disc. large grey pottery bowl disc. red/brown globular storage jar
	below floor:	H 2597 grey pottery cup, d. 7.4, h. 11.5, «IIB» H 3925 small stemmed bowl, d. 9.1, h. 8.3, «IIA» H 3929 painted conical cup, d. 12.5, h. 13.5, «IIIA» (Schmidt 1937 Pl. XXXVI)
«level 3»		

wall of room /20/. Thus, unlike Buildings 1 and 3, Building 2 seems to have little storeroom space available to it. This arrangement of space could reflect the possibility that Building 2 was built as an extension of Building 1 to enlarge it southward and to provide a more spacious main room (for an extended family?). The wall at the northeast corner to the store-room is destroyed leaving a gap which was partly filled by a buttress on the northeast wall (VI: fig. 1). The tight spacing makes it unlikely that any door was located here. Assuming no additional doors, the main flow of traffic would have been out of Building 1 through the storeroom (if that is what it was) and into the north door of room /20/ of Building 2, across that room, and through the south door to the outside. This door would, then, have been the main entrance to the whole complex. Schmidt has also recognized the problem of understanding the relationship of these two structures (1937: 156).

A general description of Building 2 has already been given elsewhere (see Part VI) but a few additional observations are in order. The original floor of room /20/ lay about -3.30 m below the surface of the square (00 datum) as shown in Schmidt's section (fig. 2). The room itself measured 6.3 m on a side (including the passage area /21/), with an overall area of 39.7 m². Adding to this the 4.8 m² of the northwest storeroom the total area of the building comes to 44.5 m². If we do not include the area of /21/ in the main room, the latter measures 36.4 m² as compared to the 20 m² of the central room of Building 1 and the 31.5 m² of

room /16/ in Building 3. Room /20/ in Building 2 had a central open hearth on the floor like that seen in the Burned Building on the North Flat (fig. 15). The type of hearth is made directly on the clay floor by enclosing a more or less square area (of about 90 m²) with a low curb wall 10 cm high. The hearth in Building 2 has now disappeared but it originally lay in the center of the room with its corners toward the cardinal points (cf. Schmidt 1937: fig. 84). Its location put it slightly east of the main door so that it was somewhat protected by the screen wall next to the door. For comparison Schmidt (1937: 156) refers to the «hearth» in DG 61 (see below and fig. 7) on South Hill, but this is an error as the architect's convention is for the type of posthole and plaster base seen in Building 3 where it is explained explicitly in his notes. The location of a simple hearth in the center of the room where people could sit around it, as opposed to cooking hearths and baking ovens set against the walls, indicates its important social function as a place of gathering as well as its usefulness in heating and lighting the room.

The main doorway in the south wall was 65 cm wide and was once closed by a wooden door which opened inward and was set on a stone door socket to the left inside. The door closed against the right jamb (seen from the outside) next to the screen wall. Thus, when the door was being opened, the screen wall totally blocked the view into the rest of the room which the visitor could only glimpse over the shoulder of whomever opened the door.

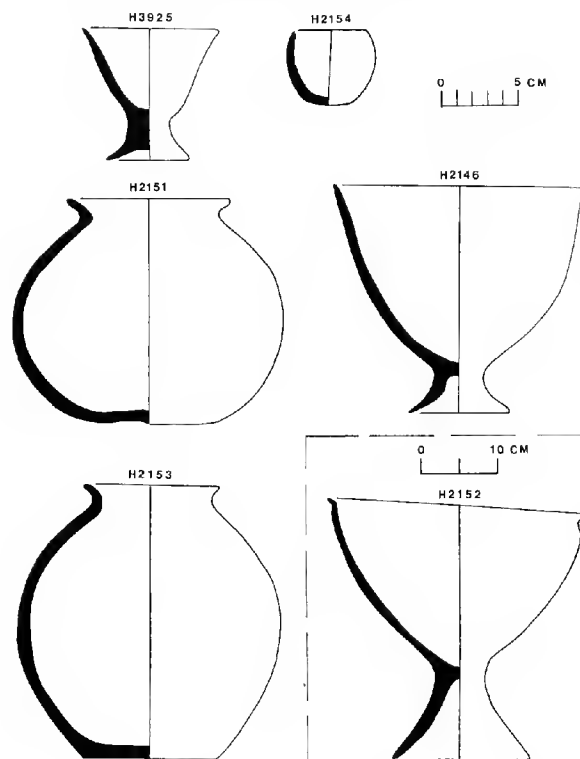


Fig. 3: Main Mound, 1932: Pottery from Building 2, and below (H3925, 3929)

The passage-like area, /21/, 3.65 m long, on the east side of the room was created by building a wall, 4.0 m long, of brick stretchers parallel to the northeast exterior wall but 85 cm from it. At the south end a low plastered sill, 25 cm high, is still preserved against the exterior wall, indicating that the passage was not closed off at this end (unless by a wooden door of which there is now no trace). This arrangement recalls that in Building 1 where a door sill 20 cm high and a jamb is indicated at the south end of a similar passage-like area. In the case of Building 2 the northern end of the passage is sufficiently well-preserved to show that it was closed off when it reached the small northeast storeroom by a 25 cm thick wall pierced by a round porthole 45 cm in diameter set at floor level. This feature recalls the same feature in the Burned Building (see below) where a porthole 44 cm in diameter leads from a long, narrow room (2.50 by 4.0 m), closed by a door at the far end, into a grain bin (as shown by the charred wheat found in it). Such portholes can only have been used for removing grain from the storage bin by means of a long-handled wooden shovel or scoop such as are used in present-day Iranian bakeries. It seems probable that such a grain bin once existed in the east end of the northwestern storeroom on the north side of the porthole in area /21/. This passageway and its counterpart in the Burned Building

compare closely with the passageway in Building 1 and suggest that the latter may have had a similar function (but see also DG 61, Building 4, below).

The northwest storeroom of Building 2 measures 1.70 by 2.80 m and has an area of 4.8 m². The east end of this room, as just mentioned, may well have held a grain bin. The door from this room to the west was 60 cm wide, the same width as the door into the southwest storeroom of Building 1. Schmidt notes (1937: 156) that fragments of grain grinding stones were found scattered about in this northeast room and the one next to it on the west. Such items would have been appropriate to areas near a grain supply.

On the north side of this same room, at floor level or slightly below, were located two pottery vessels: one, found just north of the western door jamb at -3.30 m, was described as a large grey pottery bowl; the other, just to the east of the first vessel, was a red/brown globular storage jar with low everted rim found at -3.50 m. Both were apparently discarded without further recording. Immediately below the floor of this room two additional vessels were recorded from the underlying fill: H 3925, a light grey short-stemmed bowl (fig. 3) found at -3.75 m and H 3929, a conoid cup painted with vertical bands of horizontal stripes (Schmidt 1937: Pl. XXXVI, « IIIA »). From the same depth (called « level 3 » by Schmidt), H 3925 may be

compared to H 3903 (*ibid.*: Pl. XXVI, «IIB») and to H76-81 (fig. 32) from the North Flat (where it is dated to between 3170 and 2855 B.C. (see below).

Using the archives and our field observations, it is possible to reconstruct additional information on the stratigraphy and artifacts associated with Building 2 beyond that already published. The 1931 Daily Log records the following progress. Excavation had reached to -1.80 m by July 26th. In Schmidt's cross-section this is approximately the level at which the tops of the walls of Building 2₁ should have been encountered. On July 27th the Log notes that wall tracing had begun (i.e., the tops of the walls had been reached). Therefore, all objects reported from the area above the -1.80 m level and prior to July 27th belong to the post-Building 2₁ period.

The next stage of the excavation was clearance of the zone from -1.80 m to -2.50 m on July 27th and 28th (i.e., 70 cm were removed in two days, an indication of the rate of excavation). This zone, termed «level 2», corresponded to the fill associated with the upper half of the standing walls of Building 2/2₁ to a point roughly half way down the walls. In 1976 we were able to observe that the extant mudplaster facing of the walls turns out at this point – an indication of the presence of a former floor level. In 1932 this floor was missed although the plaster line must have been clearly visible as a result of the wall trenching technique used to trace walls to their base. Also visible at this level in the wall is a change in the masonry pattern along with an increase in brick length. In other words, at a depth of around -2.50 m a floor level belonging to a second later stage of Building 2 had existed. This level matches the top of the buttresses in the original walls of Building 2 which were replaced by plain masonry as this time. The second stage of masonry is visible beginning about 80 cm above the original floor level and has been designated for convenience as Building 2₁. Thus objects recorded between -1.80 m and -2.50 m belong to the fill and floor of Building 2₁.

Below the floor of Building 2₁ the excavation was carried down between August 3 and 11 th to varying depths in room /20/ and outside the structure to the south as follows: (inside) S1, -3.45 m; S2, -3.65 m; (outside) S3, -3.60 m; S4, -3.45 m; and S5, -3.65 m (the letter S was used by Schmidt as an area designation). This lower zone of fill is also referred to by Schmidt as «level 2», the fill within the walls of Building 2 and its later reconstruction, 2₁, having been treated as a single unit. This lower zone of fill, however, corresponds only to the original building and dates to Phases D3 and D2 in the new sequence. The reconstruction, 2₁, may have taken place near the end of Phase D2 or even at the beginning of Phase D1 and lasted through that phase. Building 2₁ thus lasted through part of the period of Building 3, 3a, and 3₁. The absolute level of the tops of the 2₁ walls approximately equals the top of the D1 stratum in the pinnae (fig. 47).

The sherds found in this Building 2 zone are described in the Daily Log as follows: August 11: «level 2, nearly all grey, some red/black; grey ware of IIA in level 2; level 1 grey ware IIB» (later changed

to «IIB» and «IIC» respectively in the final publication; Schmidt 1937: 155). August 12: «level 2, grey ware prevails but some painted present». On August 12th the area was cleaned and work stopped. In general the outside area south of Building 2 (S3-5) were taken down to below the interior floor level with the exception of area S2, the eastern half of the area. This lowering resulted in the present level of the top of the buttress foundations appearing higher than the adjacent surface.

The few artifacts recorded from the fill of Building 2 (-2.50 to -3.45 m), although not necessarily found inside the structure, provide an interesting group. The Field Catalogue records a total of eighteen items of which four came the dump of this fill (H 206, 217, 218, and 261). Objects from room /20/ fill included eight baked clay quadruped figurines (H 217, 128, 129, 200, 201, 202, 204 and 208) and a clay ball (H130); pottery whorls (H 131 and 209); a flat-based bicone (H 206); a miniature bowl (H 203); and a miniature jar (H 205). Five of these objects (H127-131) appear to have been more or less at floor level (i.e. at -3.45 m). In the deposit just below floor level was found a smooth grey pottery cup (H 2597) marked as originating in the Center South area (= S4?) in «level 2-3».

Building 2 apparently had a long life as it appears to have been standing during the first stage of Building 3 (see Part VI). This latter building was built on top of a ruined structure which once stood to the east of Building 2 on the same level. To the northeast of Building 2, but unconnected to it, also stood a one-room structure, /17/, which faced an open area to the north. This open area ran between Building 1 on the west and a kiln, /3/, with associated rooms on the east. Structure /17/ was contemporary with Building 2 and, like it, was later reconstructed (/17₁/) (see Part VI).

As originally constructed, Building 2 had a carefully made buttressed facade with five buttresses along the southwest wall and six or seven along the northeast wall. The so-called «creephole» (Schmidt 1937: 156, 157) in the southeast corner of this building (as in some other reported instances) is nothing more than an excavation error as we verified in our field examination in 1976. These errors involved niches in buttressed walls or blocked doorways with jambs where the pickman cut through the brickwork thinking the side jambs or buttress offsets indicated an opening. Often these locations had later walls running across/above them. During the later life of Building 2 (2a) the niches between the buttresses to the east of the main door were filled with soil and trash and plastered over converting the facade to a plain wall. One of the workmen broke through one of these plaster «skins» and dug on through into room /20/ creating the «creephole»! Soft ash and trash were also dumped into a convenient unused space between Building 2 and the nearby room /17/ structure. This debris gradually obscured the niches between the buttresses along the northeast wall.

Eventually Building 2 in its modified form, 2a, was no longer stable and its upper walls were pulled down filling in the rooms and providing a new floor level about 80 cm above the original floor. Eighty centimeters



Fig. 4: Main Mound, 1932: Cylinder Seals H116 and H892

is about the amount of fill observable in the collapse of modern single story mudbrick structures with equally thick walls. The old walls were levelled to serve as foundations for new walls without buttressing. The property line apparently remained unchanged as the new walls were erected directly upon the old ones. Unfortunately, little can be said about this later structure, Building 2₁. The central room, /20/, remained about the same size as the earlier room with the main door in the same south location. The walls along the southwest, southeast and northeast are still preserved in part. However, neither the door/screen wall, the passage wall, nor the rear north wall are preserved high enough to indicate any of the later internal organizational features. Since the original excavators did not recognize the floor level (but apparently set the workmen to following the walls down to their base) no details of any floor features are available. The Daily Log and the Field Catalogue, however, allow the identification of some of the contents of the fill of Building 2₁. The walls of this building reached from around -1.80 to -2.50 m below datum. The fill in this zone was called « level 2 » as excavated on July 27th and 28th, 1931. Three artifacts were recorded more or less at floor level in room /20/. At -2.20 m, over the area of the northwestern storeroom and space between Buildings 1 and 2, was found a stemmed light grey bowl (H 2352) assigned to « IIIA » in the Field Catalogue. At -2.25 m a round-based cup (H 56) with a border of vertical lines above a horizontal line was found « 50 cm below the top of the southeast wall » (cf. Schmidt 1937: Pl. XXXVI, H 5218, « IIIA »). It lay just above the location of the earlier door screen wall, indicating that the wall no longer existed. At -2.45 m was discovered a serpentine cylinder seal (H 116; fig. 4) with a cow seen in profile facing a stand surmounted by a « double eye » symbol. A cross lies before the cow under its muzzle and there are other markings over its back (Schmidt 1937: fig. 118, p. 119). This context would suggest a date in the Jemdet Nasr-Proto-Elamite period, and it is to these assem-

blages in the west that one should probably look for the seal's origins.

Cylinder seals were so rare at Hesār (only two others were found) that it is perhaps useful to diverge briefly here to comment on their context. The second cylinder seal (H 892) shows a chariot, rider, and groom (Schmidt 1933: Pl. CXXXB; 1937: fig. 118; p. 199). This seal is recorded as part of an unpublished burial (DF 19, X-60) but with the comment that it is not certain that it belongs to the burial, but that it is certain that it belongs to the group of burials (see fig. 2). Burial DF 19, X-60 was found in the extreme southwest corner of the square at a depth of -90 cm over walls stratigraphically equivalent to Building 2, in DG 10. The burial thus was quite late, having been dug into « level 1 » fill which, in terms of the new sequence, would have been of Phase B/C date. The context therefore, cannot be older than the third quarter of the third millennium B.C. and, if associated with the graves as suspected, could date to the end of the millennium to period « IIIC ». The burial was identified on the Burial Sheet in the archives as that of an adult male lying on his back with his right arm flexed over his chest. It was accompanied by a grey cup with lateral beak spout (H 891) lying beside the shoulder; with a piece of bottle-pitcher on the feet (Schmidt 1937: 199 notes that a piece of typical « IIIB » bottle-pitcher was found nearby); an alabaster and a bone bead (H 893); and some tubular (and one conoid) white beads scattered on and below the chest (H 894). The seal was found near the pelvis and conceivably could have been suspended from the belt. On the basis of the fragment of bottle-pitcher and the absence of alabaster vessels, Schmidt assigns the seal to period « IIIB » (1937: 199). On the other hand, the grave contained a vessel with a beak-spout, a feature which he later states to be a characteristic of period « IIIC » (1937: 182). Another grave in the area, X-19, also contained a beak-spouted vessel, and X-12 contained a canteen of typical « IIIC » type showing that the group of graves was not necessarily all of « IIIB » date.

This material combined with the stratigraphic position makes the later «IIC» date the more likely.

The third cylinder seal (H 3710), decorated with animals and birds, was found on Treasure Hill in CH 96 in what Schmidt refers to as «doubtful» fill of «IIB» date (1937: fig. 118; p. 199). The seal was catalogued on October 12th without benefit of detailed location, depth or context. Items on October 8th and 15th in the Catalogue, however, show that excavation in CH 96 was taking place at that time in the upper part of «level 3» which Schmidt assigns to his period «IIB» (1937: 174). The seal should, therefore, date either to the end of his period «II», or to the very beginning of his period «III», somewhere early in the third millennium B.C. Thus contact with the west is indicated both at the beginning and at the end of the third millennium by the seals so far found.

In the Building 2₁ fill seven additional objects were recorded without further location: four clay quadruped figurines (H 83, 97, 117, and 123), a clay ball (H 118); a flat-based clay bicone (H 199); and a clay ellipse (H 120). The latter three items are «counters». The consistency of the relationship of these recording devices or counters with the animal figurines in this structure and the one below is worth noting. The small items – balls, cones, bicones and ellipse – found here and in South Hill belong to the assemblage of counters or recording devices currently under study as part of a reckoning system preceding writing (Schmandt-Besserat 1977). Their presence here documents their use in the late fourth millennium B.C. in what appear to be rather ordinary households of stage D3 and later on the Main Mound. If they were used for keeping account of animals in some way, the latter must have been kept elsewhere as there is no evidence for their presence in the immediate vicinity of the houses. The occurrence of these counters at Hesār at the end of the fourth millennium B.C. along with the cylinder seals and the inscribed clay label (H76-102) found on South Hill (p. 65) show that this settlement participated in that larger «Proto-Elamite» network of trade and communication currently under study at various sites in Iran (Kohl 1978). Analysis of flotation samples and animal bones from excavated deposits in this part of the site should further elucidate the economic aspects of life in these periods at the end of the fourth and the beginnings of the third millennium B.C.

What happened to the area after Building 2₁ was abandoned? The section shows that 1.80 m of trash and fill accumulated, probably derived from buildings in neighboring squares as no structures are indicated above Building 2₁. The nearest graves were crowded into two burial grounds, one along the eastern slope of the mound (DG 11/01, CG 90) dug into the ruins of Building 3₁; the other, along the west slope in DF 18/19 and DG 09. The crest of the hill over DG 10, western DG 00, and eastern DF 09 and CF 99 was left essentially unused. Many of these graves, dug into the terminal phase of the mound, were attributed by Schmidt to the last period of occupation («IIC») when it would appear that the remaining settlement had largely moved to Treasure Hill.

Taken as whole, the evidence for the stratigraphic

correlations, ceramic and small object typology, and radiocarbon dating would indicate that Schmidt's original estimate of the dating for Building 2/2₁ as belonging to his period «II» (in the sense of being late fourth-early third millennium B.C.) was correct, whereas his subsequent revision and publication of these structures as belonging to «IIB» (the middle or later third millennium B.C.) is incorrect. The confusion arises directly from the lack of definition of the longevity of pottery types and the real nature of the transition from period «II» to «III». Thus the attribution of walls on plans, of areas excavated for given periods, and the context of individual objects found in the fill, is thrown into question in a number of areas in the publication and cannot be taken at face value without careful rechecking of the available evidence.

DG 01/11: Building 3 and 3a (Phases D2/D1) and 3₁ (Phases D1/C)

Building 3 stood to the east of Building 2 in squares DG 01 and DG 11 and may be dated to Phase D2 and early Phase D1 in the Main Mound sequence (Part VI: fig. 1). The structure went through three stages: the original building (3), a fire and restoration (3a), and a total later reconstruction (3₁). In several respects this structure deserves comparison with those already described.

A general description of the Building has already been given (Part VI). Its plan recalls that of Building 1 and 2 in that it consists of a central room, /16/, entered from the southeast, with a storeroom, /19/, added to the northeast side. The basic building was laid out and constructed as a single room with four externally buttressed walls. The walls formed an irregular quadrangle lacking right-angled corners. The floor was -2.70 to -2.80 m below 00 datum according to the section (fig. 2). The buttressed exterior was built with the same masonry system seen in Building 2 and elsewhere on the site (see below). The most unusual feature of the building was three or four rows of «niches» set in the south face of the north wall of room /16/ in the manner of those in Building 1. The lowest row was 40 cm above the floor level of stage 3a (built after the fire). This floor level appears to be either the same as the original floor or was laid down over the original floor. Without excavation we could not determine this point. Each niche formed a subrectangle with rounded corners and a concave upper surface (fig. 5). Schmidt calls these «crescent-shaped» which is not strictly correct for, although the upper surface is concave, the sides and bottom are straight with only rounded corners. Schmidt gives the average dimension as 18 cm wide, 10 cm high, and 16 cm deep. What function the three rows of these may have had is unknown but it should be noted that when the structure burned these holes burned quite black on all surfaces while the face of the wall burned red. Although no charcoal remained in them it is possible that wooden elements of some kind were involved.

Shortly after the main room's construction a store-room was added on the northwest side, abutting and overlapping the exterior buttresses. The door was



Fig. 5: Main Mound, 1796: Building 3 niches (looking north)

TABLE 4: STRATIGRAPHY AND ARTIFACTS: BUILDING 3

SCHMIDT:	STRATIGRAPHY:	ARTIFACTS:
	Surface ~80 cm	
« level 1 » « IIC »	fill: « IIC » Structure	H 1710 clay quadruped figurine H 1711 sheep figurine, clay H 1712 clay object H 1732 pottery lid H 1754 pottery bead H 1755 shell bead
	-1.80 m	
	floor:	disc. large grey spouted jar (cf. H 5, Schmidt 1933: Pl. C) disc. spouted stemmed light grey cup (cf. H 4, <i>ibid.</i>) disc. crude brown globular jar, slightly inturned shoulder
« level 1-2 »	fill: Bldg 3 ₁ Phase D1 into (C?)	H 1980 alabaster bead H 1981 clay ram figurine H 1982 pottery ring H 2004 stone mortar or drill base (?) (Schmidt 1973: Pl. LXIV) H 2018 clay ram figurine (<i>ibid.</i> : Pl. XLV) H 2019 copper (<i>ibid.</i> : Pl. LIV)
	-2.0 m	
	floor:	H 2546 chalcedony arrowhead H 2547 alabaster head (<i>ibid.</i> : Pl. LXX) H 2548 copper tube H 2549 clay quadruped figurine H 2550 alabaster bead H 3033 copper finger ring
« level 2 » « Crescent Room »	fill: Bldg 3/3a Phase D2/D1 3175-2920 B.C.	
	-2.70/2.80 m	
	floor:	H 5124 light grey/brown conical jar with incised concentric circle around rim d. 4.5, h. 7.5, « IIA? » H 5233 oval stone weight

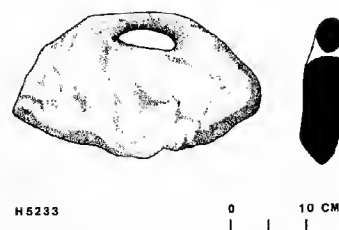


Fig. 6: Main Mound, 1932: Building 3a, stone weight

formed by cutting away the back of one of the niches between two buttresses providing an entrance with straight-sided jambs. Room /16/ measured 6.3 by 5.0 m, or 31.5 m², and storeroom /19/, 2.2 by 3.1 m, or 6.3 m². These two rooms together provided a total area of 38.3 m², slightly smaller area than for Building 1 or 2.

There was then a severe fire which burned the floor and walls of the main room and some of the exterior to a bright orange-red color. Room /12/, to the north, contained a deposit of burned debris 17 cm thick. The building, although damaged, was still salvageable and was renovated. At this stage (3a) the exterior southwestern buttressed wall was abandoned and the room was shortened by the construction of a narrower straight wall east of the original (VI: fig. 1). At the same time, to relieve the side walls of some of the roof weight, a strong center column of wood, 25 cm in diameter, was placed in the center of the new room (5.5 m from each end wall, 2.45 m from the northwest wall, and 2.35 m from the southeast wall) with a mud plaster base 90 cm square and 15 cm high set around it on the floor (a practice used at Tepe Hasanlu in western Iran on a much larger scale in columned halls of the Iron Age; Dyson 1977). The door to the northeast storeroom, /19/, was blocked and the room was replaced by a new storeroom, /18/, built on the southeast side against the buttressed facade. This new room was 1.4 by 2.5 m, or 3.5 m² in area. The main room had been shortened to 5.7 m giving it an area of 28.5 m², a loss of 3 m². The total floor area of renovated Building 3a thus became 32 m². This area represents a reduction of 6.1 m² from the original plan. At this time a short (1.8 m) screen wall was built against the northeast side of storeroom /18/ on the outside to provide protection and privacy to the main door. This latter was 83 cm wide with straight jambs. It replaced a niche between two of the buttresses of the original structure. Access to the storeroom was through a porthole 53 cm in diameter and 80 cm above floor level. The size of this opening is comparable to those already described for access to grain-bin storage areas (see above) and the conclusion would seem indicated that this small room was also used for such a purpose. It should also be noted that the main room was equipped with a three-level bin or hearth on its east wall. Schmidt noted that grinding stones were scattered about (1937: 156) along with an oval stone weight (H 5233) with marks of rope grooves (fig. 62). Elsewhere on this floor

level lay an incised grey pottery jar (H 5124). In the fill above the floor but below the level of the top of the « crescent » niches was found a chalcedony arrowhead (H 2546) of the type known from the Burned Building on the North Flat at a much later date. Since many later graves penetrated this fill it is most probable that this object, like others (H 2547, H 2550, two alabaster beads; H 2548, a copper tube ornament; and H 3033, a copper finger ring), were stray finds from the graves. A pottery animal figurine (H 2549) was also found in the fill.

The interior walls were replastered in the 3a renovation, sealing the rows of crescent niches filled with burned soil and ash. Some of the exterior niches between buttresses were similarly sealed up – at least on the northwest side where two storerooms, /12/ and /11/, with an entrance at the north end of room /12/, continued in use. The possibility that a secondary door was cut through the wall into room /16/ at the northeast corner of the room cannot be completely ruled out since part of that wall is now missing. However, the line of the foundation can be traced and the position of the original buttressing established. Any door would have had to have been cut through a niche in the wall facade next to the buttress and would certainly have used the buttress faces as jambs. Since the western end of the niche wall is still intact for a length of 25 cm a door in this location seems unlikely.

Eventually, as in the case of Building 2, the old walls had to be razed and a new structure (3₁) built using the older one as a foundation. This new structure may be seen in the standing walls in the form of a change in masonry positioning and by a shift to longer brick size. The old main door was blocked and given up as an entrance. Little else can be said about this upper structure except that the main door was located elsewhere and that it appears to have retained the basic area of the main room and the storeroom on the southeast. No features within the room are preserved or were recorded. In the published section the tops of the walls of Building 3₁ appear to be about 1.40 m. below 00 datum. The floor level of Building 3₁, to judge by the masonry change, lay about 80 cm above the floor of Building 3a, or about -1.90 m below datum. Thus Building 3₁ would appear to have been founded during Phase D1 while Building 2₁ was still standing and probably continued to exist into early Phase C. The tops of the walls of Building 3₁ lie below strata which run under the four ovens in DG 20 and the radiocarbon date from the stratum immediately below them. Therefore, Building 3₁ went out of existence prior to that date, c. 2640-2390 B.C. (P-2618).

In the Field Catalogue it is noted that when object H 1980 was reached « level 1 » (the « IIIC » structure lying above) was removed. All of the objects listed preceding this notation from this square are specifically noted as belonging to level 1. Those which follow are simply below level 1 in the square and may well be stray items from graves which penetrated to within 40 cm of the floor of Building 3a. These objects include: an alabaster bead (H 1980); a copper tube ornament (H 2019); two baked clay ram figurines (H 1981, 2018); a pottery ring, (H 1982); and a stone mortar (H 2004).

The abandoned area was used extensively along the slope as a burying ground with burials penetrating the «IIC» Structure and Buildings 3₁/3 to a depth of -1.0 to -1.80 m below the surface. When the Catalogue numbers reach H 2546 objects begin to be recorded as from the «Cres(cent) Room», i.e., room /16/, named from the niches which had become visible at the top of the wall.

After Building 3₁ went out of use another structure, the «IIC» Structure, was built in the northwest quadrant of DG 01 and adjacent area with the same northwest-southeast orientation seen elsewhere (Schmidt 1937; fig. 84).

The straight southeast wall was preserved for a length of between 4.0 and 4.5 m but most of the main room lying to the north had been destroyed in antiquity. Along the center of this wall lay a small storeroom which measured 1.8 by 1.2 m, or 2.2 m². The fragmentary plan recalls part of Building 3/3₁. The displacement of location indicates that enough time had elapsed, so that interest in older property lines had been lost and old wall lines had disappeared. A number of small items are listed in the Field Catalogue as coming from the floor level during the cleaning operation. These were a large grey carinated pot with flat base and tubular side spout and two pairs of repair holes (cf. Schmidt 1933: Pl. C, H 5, «II»), discarded; a light grey stemmed bowl with carinated rim and open rim spout (cf. *ibid.*: H 4, «II»), discarded; and a crude brown jar with globular base and slightly inturned narrow shoulder, discarded.

There would seem to be no features in any of these structures, to set them off significantly from Buildings 1 and 2/2₁. It would appear that this area of the settlement was filled with ordinary households set initially in fairly open areas with a common orientation

toward the winter sun and away from the cold prevailing northwest wind. As time passed these buildings grew by accretion through the addition of formal rooms opening into the interior, or through the addition of storage. It may be noted in passing that neither the scale of the open areas, nor the size of the ancillary curved spaces suggest the accommodation of animals in the immediate vicinity.

South Hill: DG 61: Building 4

The only location at Tappeh Hesār where a comparable building plan is complete enough for the comparison of an ordinary house is in DG 61 on South Hill (fig. 7), northeast of the area explored by Tosi. Here in a level which should be roughly equivalent to Main Mound Buildings 1 and 2 to judge by the radiocarbon dates, lay a well-preserved two-room house which, for convenience, we shall call Building 4. This structure, like those already described, also consisted of a rectangular main room, /15/, oriented northwest-southeast with doorways in the north and south walls. A second room, /18/, lay along the northeast side and was entered by two doorways from the main room. The structure, like Building 3, suffered from a fire and was then also renovated (Building 4a). It should be noted that on the basis of present dating Building 3 and 4 may well have been burned in the same incident but the date of that event is long before the fire which destroyed the Burned Building on the North Flat. Hence not all evidence for burning visible at Hesār necessarily represents the same event. Given that fact, it is no longer certain that the entire settlement was ever burned all at one time. This proposition certainly cannot be demonstrated by the available evidence.

The main room of Building 4 measured approximately 4.9 by 4.5 m. Its area of 21 m² is considerably

TABLE 5: STRATIGRAPHY AND ARTIFACTS, BUILDING 4

SCHMIDT:	STRATIGRAPHY:	ARTIFACTS:
«level 1» Published under «II» but called «IIIA» (1937:107)	Surface -30/40 m fill: Bldg. 4 3365-3010 B.C.	burial: x-2 x-3 x-6 fill: H2146 grey stemmed bowl, d. 15.7, h. 14.3, «IIB» H2147 painted conical cup, «opposed tongues» (Schmidt 1937: Pl. XXIV), «IIB» H2148 painted stemmed bowl, d. 8.2, h. 10.2, «IIB» H2149 grey pottery bowl, d. 15.2, h. 7.3, «IIB?» H1744 copper wand with wire loop end (Schmidt 1937: Pl. XLVIII) H1745 bone whorl (ibid: Pl. XXXB) H 1782 flat circular stamp seal (ibid: Pl. XXVIII)
-----	-1.90/2.00 m Bldg 4	floor: H 2151 crude globular jar, short neck, d. 10.8, h. 14.5, «IIIA?» H 2152 burnished large stemmed bowl everted rim, d. 32.5, h. 31.7, «IIIA?» H 2153 smooth oval grey jar, short neck, d. 9, h. 17.8, «IIIA» H 2154 small hemispherical cup, d. 4.9, h. 4.0, «IIIA» H 2155 small grey jar, neck, d. 7.9, h. 11, «IIIA» disc, oval hand grinding stone disc, grinding stone disc, large oval hand grinding stone disc, 1/2 hand grinding stone disc, 1/2 stemmed grey bowl disc, grey stemmed bowl (cf. H1, Schmidt 1933: Pl. C) disc, long-stemmed grey bowl, «IIA» disc, grey storage jar disc, painted conical cup (gazelles) disc, painted potsherd

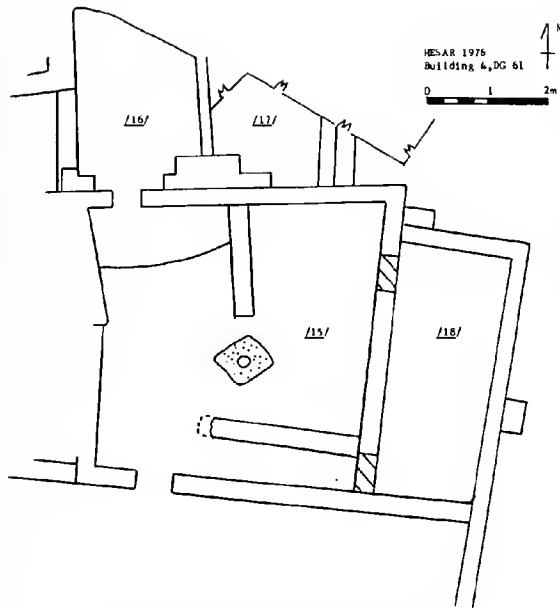


Fig. 7: South Hill, 1976: Building 4 Plan, DG 61

smaller than that of the main rooms of the other houses discussed. The northeast room, /18/, measured 1.8 by 4.2 m, or 7.6 m². The total floor area of the building was thus 27.7 m². No buttressing of the type described above was evidenced in the exterior walls although individual buttress elements were added to the walls at odd points for stability (perhaps added after the fire). Within the main room in the initial construction of Building 4 there was evidence for a slightly depressed floor area inside the northern doorway in the manner seen also in Building 3a. A short (1.90 m) screen wall projected into the room just east of the north doorway (which was 44 cm wide). A door 60 cm wide in the northeast wall led into the northern half of room /18/. A second door, 63 cm wide, led through the same wall to the southern half of room /18/. A fourth door, 60 cm wide, led through the southeast wall to the outside.

The building had burned. Radiocarbon sample P-2715 gives a corrected date for the burning of 3365-3010 B.C. In the rebuilt structure (Building 4a) the door screen wall was replaced capping a layer of charcoal below. The northeastern door was blocked and plastered over, sealing in charcoal from the fire. Charcoal from these two sealed sources made up sample P-2715. At this same time a second floor of mud plaster was laid down, the walls were replastered, and the southern door into room /18/, was blocked and plastered. In the center of the main room to judge by the architect's symbol drawn on his original plan a wooden column was set up to strengthen the roof (as in Building 3a). No oven is shown on the plan but in the plot record notebook two bricks are shown against the southern part of the northeast wall indicating some kind of cooking structure. A narrow partition wall (2.75 m long), made of two rows of bricks laid as

stretchers, was built against the northeast wall of room /15/ slightly overlapping the blocked southern doorway into room /18/. This feature recalls the passage areas of the other buildings but, as there is no porthole opening at the far end, it is uncertain what the purpose may have been in this case. This wall was 30 cm wide and was coated on the south face with 4 cm of mud plaster. The mud brick contained some straw and measured 49/50 x 15 x 9 cm. The stretchers were laid so as to slightly overlap from course to course, so that the vertical joints were not aligned. The exterior walls were all built of bricks 26/29 cm wide with varying thicknesses of mud plaster preserved. The bricks were usually 39 x 26/29 x 8/8.5 cm in size. The north door is described as a «creephole» by Schmidt but appears again to have been incorrectly cut through the wall. The excavation left continuous walling above which no doubt does not belong to the original building (a point needing study by further field work). The walls are preserved to a height of 1.6 m while the top of the doorway as cut through is only 48 cm high and 44 cm wide. This scale matches portholes elsewhere but is smaller than any doorways measured. The area north of the opening forms a secondary enclosure limited on each side by a small buttress set against the outside face of the wall. On the west an original open area between Building 4 and another structure (1.40 m away) was closed by a narrow brick wall. On the east a small wall ran northward from the buttress closing in the area on that side. Additional single buttresses were added to the exterior northeast corner and to the middle of the exterior of the northeast wall, probably to stabilize the partly burned structure during renovation. In this stage of usage room /18/ appears to have been given up and completely sealed off. Rooms are sealed off like this even today in traditional houses in northeastern Iran (personal communication, Lee Horne). The southeastern wall of the main room does not form a straight line but appears to be formed of two sections which run slightly into the room and meet at a kind of joint. Since this mass of brickwork could not be cleaned in the available time the nature of the construction is left obscured. The walls of this building on the north side stand to a height of 1.60 m, i.e., to within 30-40 cm of the surface of the square. No later structure was defined above Building 4. Six graves were dug into the area after the abandonment of the building; none actually penetrated into the rooms, however. These graves contained pottery vessels which are clearly later than the building: in x-2, H 2146 (fig. 3), a eup-bowl; in x-3, H 2147, a painted conical-based cup with opposing «tongue» patterns (Schmidt 1937: XXIV, 114); x-6, H 2148, a painted footed goblet with a vertical and horizontal line pattern; and x-6, H 2149, a grey pottery bowl. Grave 6 also contained beads of bitumen (H 2150), a material which had to be imported from elsewhere as did many other materials used in this period.

Objects on the floor of the main room (fig. 8) were in two groups, one near the fireplace and the other near the center post. In the field notes the east half of the room is referred to as R1 and the western half as R2; in the final publication these and similar



Fig. 8: South Hill, 1932: Building 4, Objects *in situ*, room /15/

field numbers are replaced by a series of S(ection) numbers; in this case R1 and R2 became S15, rendered here as an area number, /15/. The objects near the fireplace included a smooth, grey, oval jar with short neck (H 2153); a hand grinding stone, roughly oval (discarded); a grinding stone (discarded); a small hemispherical grey cup (H 2154); one-quarter of a grey stemmed bowl (discarded); a crudely made, globular pot with low vertical neck, fire-blackened, and found between the two bricks set against the wall indicating their use as a pot stand over a fire (discarded); a large roughly oval, hand grinding stone; and a small grey pottery jar with two incised lines around the neck (H 2155). The second group, near the center post, consisted of a crude globular jar with short neck (H 2151); a earinated grey stemmed bowl (cf. Schmidt 1933: Pl. C, H 1, «II», without the flare at the base of the foot), (discarded); a long-stemmed grey bowl (cf. Schmidt 1937: Pl. XXIII, H 2889, «IIA»), (discarded); a smooth, grey/brown hemispherical bowl with flat base (discarded); a large, crude, grey storage or cooking jar (discarded); and a grey stemmed bowl with large outward tapering rim (H 2152). From the western half of the room in the northeast corner by the screenwall was found a fragment (1.65 cm high and 1.54 cm in diameter) of a painted potsherd. It was painted in four registers with zigzag ladder patterns (discarded). In the northwest corner of the screenwall lay a half a hand grinding stone (discarded). Elsewhere in the room on the floor lay a conical cup painted with gazelles and crossed lines (cf. Schmidt 1937: Pl. XX), (discarded). Also from the western half of room /15/ «a little above» the floor came H 1744, a copper wand with

wire loops at the head (Schmidt 1937: Pl. XLVIII, 194), and H 1745, a bone whorl (*ibid.*: Pl. XXXB, 122). Also in the fill of the square low in «level 1» (but perhaps not actually in Building 4a) was found H 1782, a flat circular clay stamp seal with paired zigzag lines as a pattern (*ibid.*: Pl. XXVIII A). With the exception of the seal, these items have been variously assigned by Schmidt to periods «IIA», «IIB», and «IIIA»; all in fact come from a single context: Building 4a.

Buttressed Buildings in General

One of the aims of the examination of architectural remains at Hesar (which appear in the published reports to be quite undistinguished) was to explore the question as to whether any significant innovations occurred in building plans or methods which might correlate with shifts in other categories of cultural activity. In the process of making our initial observations on the sequences of the Main Mound and the North Flat we discovered the early use of a buttressed exterior wall system – a system which then later went out of use. Since Building 2 with its buttressed walls appeared to fall early in the development of the grey pottery sequence on the Main Mound it seemed appropriate to focus our limited time in the field on comparable structures in order to record construction details and to assess their probable chronological position in stratigraphic terms.

A combination of field observation and archival research shows the presence of some nine examples of structures with external buttressed walls (i.e., repeating buttresses which are a bonded part of the

wall as opposed to single buttresses added at odd points to an existing wall for stabilization). These special structures occur in all areas of the site occupied in period «II» and the conclusion appears warranted by our 1976 work that they were characteristic of the period at the end of the fourth millennium B.C. and no other. They occur on the North Flat (CF 48 /14/; part of an exposed wall in CF47; and a short stretch of a narrow wall in CF36; Schmidt 1937: fig. 103); on the Main Mound (Buildings 2 and 3 in DF 09 and DG 01, see Part VI); on South Hill (two examples discussed by Tosi, Part V, in DF 89 and DF 78/79); and finally, three examples on the Painted Pottery Flat in DG 36 (Schmidt 1933: fig. A), DH 34/35 (*ibid.*: fig. 26) and DH 44 (*ibid.*: fig. 23).

Schmidt, interpreting the architect's plans in Philadelphia while writing the final report (1937), and applying the preconceptions formed by his work on the burial pottery in terms of type-fossil indicators, assigned these various structures to period «IC» (DH 34, DG 36), «IIB» (DG 78/79, 89), «IIIA» (DF 09, DG 01, CF 36 and CF 47), and «IIIB» (later DF 09 and DG 01) as may be seen in Schmidt 1933: fig. A (DG 36) and 1937: figs. 26, 63, 86, and 102. It is the contention of the present authors that all of these structures were built using a single masonry system and that a careful re-examination of the stratigraphic evidence indicates that they all belong to the end of the fourth millennium B.C. (Schmidt's period «II»). Let us examine the evidence in a little more detail.

North Flat: CF 48 Butressed Structure /14/

The buttressed structure, /14/, in CF 48 (fig. 9) was preserved only in the northeastern corner where the wall lengths were 3.5 and 4.0 m (the latter the southwest wall). The structure had been oriented northwest-southeast in the manner of those on the Main Mound and South Hill. The western end of northeastern wall section was cut away by the intrusion of burials CF 48 x-9 - 13 and x-17, and the construction of wall 7 in the southwestern half of the square. Wall 7 represents a period «IIC» structure built directly on the abandoned period «II» remains. Burials CF x-14 and x-15 penetrated the central room area designated by Schmidt as S 14 (hereafter /14/) and are, therefore, later than the buttressed structure. The buttresses on the south end of the south-eastern wall were over-ridden by construction of rooms CF 58 /2/ and /3/ which were later burned and which produced radiocarbon dates between 3170 and 2880 B.C. (see below). Three samples from levels stratigraphically below the buttressed building in the adjacent area confirm this range (P-2617, 3355-2955 B.C.; P-2699, 3355-2945 B.C.; P-2704, 3160-2900 B.C.). The sequence of events would appear to have been as follows: construction of structure /14/ around 3000 B.C. (i.e., period «II»); partial decay of the southeast wall and construction of adjoining rooms /2/-/3/ which made use of the wall but not of the buttresses; burning of the two rooms, use of the ruined area for scattered graves of period «II» type, abandonment of the area until construction of the «IIC» structure in the late third millennium B.C.

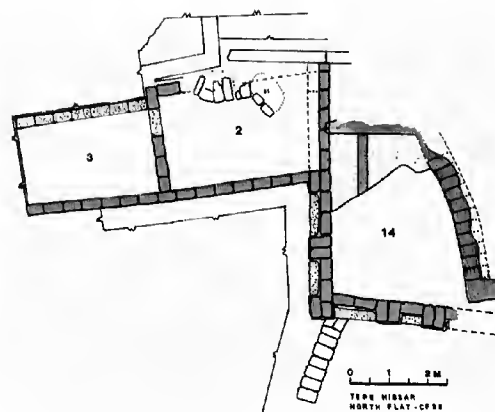


Fig. 9: North Flat, 1976: Plan of CF 48 /14/ and CF 58 /2/ and /3/

The masonry of the buttressed wall was cleaned and the method of construction (as used in all of these structures) made evident. The «intended» brick size (i.e., the expected size on which wall dimension are based and which reflects the majority of brick sizes, or the size of the brick used plus the mortar added in the vertical joints) was 60 by 30 cm. Whole bricks and half bricks were used. This size determined the scale of the resulting wall features. In making measurements for comparisons it should be noted that a number of bricks need to be measured in order to come up with the generally intended size in relation to wall dimensions. It is also necessary to measure the mud plaster thickness on the face of the wall and to note whether plaster was present or absent on the wall face. Plaster is often as thick as 5 cm on a face providing a variance of 10 cm in measurements. Variations in thickness of mortar in vertical joints can also add to widths of buttresses, niches, and walls. The variance in vertical mortar thickness usually accommodates the variance in individual brick sizes so that wall faces, etc. come out even. Thus it is essential to record such information in detail since it, along with brick deformation due to compression from overlying deposits or the lateral thrust at the time of collapse, partly explains the variation in wall dimensions and brick size. Mud brick walls are unstable and changing objects, and the dynamics of this change must be taken into consideration in attempting to describe standard elements. Variance in actual brick size, in addition to deformation due to compression, subsidence, etc., may also be explained by the use of bricks from more than one brick maker. Under those circumstances more than one wooden frame will have been used for making the bricks and a variance of 2 or 4 cm need not be significant. We find for example two categories of brick size in common use: one with a length on the average of 60 cm and a variance of 62 cm and rarely 64 cm; the other with a length of 50 cm with a variance of 52 or 54 cm. Since these sizes occur together in walls of 60/62 or 50/52 cm-sized bricks it is evident that a

standard size was intended. It may also be observed that in less carefully constructed buildings belonging to the less affluent members of the settlement many salvaged whole and broken bricks from older walls have been reused (as is the case today) to save labor costs. The bricks in such structures vary greatly in size. This practice may be considered to some extent a clue to the relative cost of the structure and, indirectly, perhaps to the social status of the builder.

The foundations of the buttressed walls were laid in a shallow trench. In the CF 48 structure the foundation consisted of five courses of brick (60 x 30 cm) laid in alternate courses of headers and stretchers. This system made a wall foundation 60 cm wide without plaster. The top of the fifth course was at ground level. On this course a free-standing wall was constructed consisting of an inner wall 30 cm wide made of bricks laid as stretchers (whole bricks 60 cm long and half bricks 30 cm long). Buttresses were bonded in at the building corners and at spaced intervals along the facade. The buttresses were constructed using whole bricks as both headers and stretchers and half bricks were needed to provide a total thickness from front-to-back of 60 cm, matching the foundation width. Each buttress projected 30 cm in front of the inner wall face. The buttress normally contained one header 30 cm wide and one stretcher 60 cm long in each course, making it 90 cm wide without plaster. The position of the header in each course alternated from left to right and back again. Thick layers of clay mortar were used between courses, but less mortar was used in vertical joints. In some cases no vertical mortar was used. The clay plaster which covered the surface was of a finer quality material than that of the bricks and it is evident that separate processes were used to prepare brick clay, mortar and plaster. In the existing wall of CF 48 /14/ the corner buttress measures 90 cm along the southeast face (30 + 60 cm) and 50 cm on the northeast face (30 cm + plaster). The first niche on the northeast face measures 120 cm with plaster at the ends (two 60 cm stretchers as base). The first buttress from the corner is 90 wide (30 + 60 cm) while the second niche is 63 cm (no plaster, one stretcher 60 cm long as base), and so on. There seems to have been no attempt at absolute regularity of niche or buttress widths except as necessary to accommodate multiple combinations of brick lengths and widths. The thickness of bricks in local areas of wall varies from 9 to 11 cm and has been affected by wall weight, compression from overburden, subsidence and so on. A tolerance of 2 cm would seem reasonable given the variance in the normal brick size. The masonry of the inner wall on the southeast side consisted of bricks laid as stretchers (58 cm long) on top of triple courses of half bricks used as headers (varying in width from 26 to 31 cm and probably used secondarily). These three courses in turn rested on another course of stretchers. Intended brick size was 58 x 30 x 10 cm. An underlying earlier wall (wall 9) was built of bricks measuring 52 x 30 x 10 cm, another common size in this period. The two overlying burned rooms, CF /2/ and /3/, were built of irregularly laid bricks 58 x 30 x 10 cm used as stretchers.

South Hill: Buttressed Structures: DF 78/79 and DF 89

Two buttressed walls are visible on South Hill – the Buttressed Structure in DF 78/79 and the Stairway Structure in F 89 (Schmidt 1937: fig. 62; Part V). The stratigraphic context of these structures has already been discussed by Tosi and Bulgarelli (Part V). They are dated in general terms to Schmidt's period « II ». Although located west of the DG 61 structure (Building 4), these structures lie in approximately the same stratigraphic zone. Building 4 was dated to 3365-3010 B.C. (P-2715) by radiocarbon.

The buttressed Structure of DF 78/79 (fig. 10) indicates a larger scale than the others so far discussed as it is preserved along its west wall for a distance of some 8 meters. The buttresses are on the western, exterior, face and are bonded into the wall proper. Each course of the buttress consists of one header and one stretcher placed in reversed position in alternating courses. The bricks measure 50/52 x 25/26 x 10 cm, the same size used in the lower walls of CF 57 in the North Flat and there dated to 3160-2900 B.C. (P-2704), 3355-2945 B.C. (P-2699). The width of the buttress is thus 76/78 cm (50/52 + 26 cm) and the depth from front-to-back 50/52 cm. The inner wall itself is 25/26 cm thick, having been built of the same sized brick laid as stretchers. A foundation course which appears to belong to an earlier wall (sand and ash lenses intervene) is made of bricks 24 cm wide laid as headers. Four buttresses are presently preserved and perhaps a fifth – but the wall is obscured at its southern end by an abutting parallel wall on the west. The general plan of the structure remains unclear as there was no time to reclean it. A major feature was a large room, /11/, not quite 5 meters square with a central circular hearth depression (a) and a door leading to adjoining area to the north, /10/, and south, /12/ (Schmidt 1937: fig. 63).

A second buttressed structure was connected with the Stairway Structure in DF 89. This structure is not shown on Schmidt's plan except for a solid wall on the east side of /67/ (Schmidt 1937: fig. 63). It is, however, shown on Tosi's plan (Part V). Three buttresses are preserved bonded to the main wall on the east with the same system of alternating headers and stretchers already described for DF 78/79. Bricks measured 52 x 26 x 10 cm with wall measurements tending generally to reflect multiples of these dimensions with variability added by irregular plaster preservation. The wall face on the north side of the stairway is also buttressed. One full buttress and part of a second are preserved. The stairs are built against the face of this wall, partially obscuring the lower part of it. These walls lie in the same stratigraphic zone as the structure in DF 78/79. A carbon sample from the fill underlying the buttressed building of DF 89 /10/ produced a date of 3670-3500 B.C. (P-2759) making the buttressed structure somewhat later, i.e. later fourth millennium B.C. or period « II ».

Painted Pottery Flat: Buttressed Structures in DG 36, DH 34/35, and DH 44

The presence of buttressed walls is attested in several areas of the Painted Pottery Flat: DG 36 and DH 34/35/44 (Schmidt 1933: fig. A; 1937: fig. 23).



Fig. 10: South Hill, 1976: Butressed Wall of DF 78/79 (left, looking south)

In DG 36 the original plan is badly drawn, making the thickness of the walls irregular and giving the impression of sloppy masonry work. Field observation in 1976, however, shows that in fact they were originally rather carefully constructed (fig. 11). The remains represent two structures: one, occupying the center of the square has a buttressed wall along its northeastern facade. Two complete and part of a third buttress are preserved. The walls are built over earlier walls which act as foundations and which consist of bricks 52 cm in length laid as stretchers. Facing this buttressed structure in the northeastern corner of the square is what appears to be the corner of a second structure with a buttressed wall along its western side. A corner buttress is preserved and part of the first niche. The bases of the preserved buttresses are 90 cm below the tops of the walls. Below that is a foundation of 2-3 courses. Across the space between the two buttressed walls and abutting each runs a secondary partition wall. The excavation of the square was carried down to between two and three meters leaving these walls standing on lower remains. Thus, in section (Schmidt 1933: fig. A) they appear as if standing on the bottom of the excavation. Such is not the case. There is a lower structure in the form of a T-shaped wall junction in the southeast corner of the square and a small wall running off to the southwest near x-16 (Schmidt 1933: fig. A). The plan is captioned «Hissar I Remains», an attribution which is certainly incorrect as an examination of the field records and the remains still

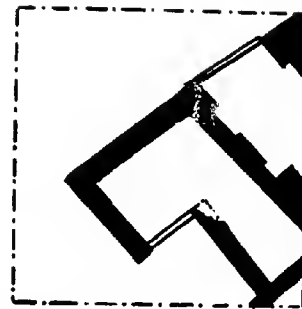


Fig. 11: Painted Pottery Flat: Revised Plan, 1976, DG 36

visible shows that the top two meters of the Painted Pottery Flat represent a continuous stratum of period «II» date over the whole area.

In DH 21 and DF 73 period «II» walls also rested on lower earlier ones. In DH 21 the tops of the period «II» walls lie 40 cm below the present surface of the Flat, while in DG 69 the wall tops are 60 cm deep. In this area the walls are overlain by a layer of sherds and debris with copper slag *in situ* at its base (i.e., 40 to 60 cm below present surface). It is readily apparent from an examination of these areas and others that the period «II» settlement covered the entire site and was probably more or less co-terminus with the area

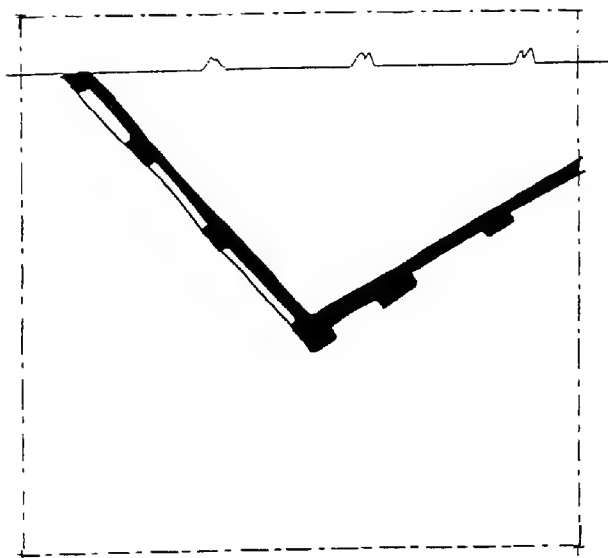


Fig. 12: Painted Pottery Flat: Butressed Wall Plan, DH 34 (after Schmidt 1937: fig. 23)

of period « I » remains (as now known) while the later, period « III », houses and cemeteries were restricted to the mounded areas. Since the inhabited area seems to have been separate from the areas used for burials at any given time, the actual size of the later settlement must have been considerably reduced. This conclusion must be qualified, however, by the fact that an unknown quantity of the mound has been removed in modern times from the west and northern sides of the site as shown by the abrupt contours and remnant pinnacles visible on the topographic map and in the field.

In the large excavated area DH 34-36/43-46 a layer of silt, sherds and trash is visible to a depth of 80 cm below the surface with a particularly heavy layer of sherds in the lower 26 cm. At base of this layer lie the tops of the highest preserved walls in the deposit.

Figure 26 in Schmidt 1937 shows a large structure, /69/, with buttressed walls in DH 34 colored black (shown more clearly in Schmidt's fig. 23). Two long walls form the south corner of a large structure running off into the north baulk (fig. 12). Along the southwest facade four buttresses are indicated (the actual structure is now gone and cannot be observed), and three are shown on the southeast wall, with a fourth presumably hidden by an overlying wall. Over eight meters of the southwest wall was preserved, and more than six meters of the southeast wall, giving some indication of the scale of the structure whatever it was. No internal features can be reconstructed from the plan as published. The wall itself is drawn in the architect's convention for a single brick thick wall (made of bricks laid as stretchers) with the buttresses doubling the width in the system already previously described in this discussion. This structure lay immediately below the higher fragmentary walls (Schmidt 1937: cf. figs. 22 and 23). The base of the buttressed walls form a

common level with wall in DH 35 and DH 36 as seen in section (*ibid.*: fig. 26). The stratigraphy of this area is complex, was not worked out in a controlled fashion and was inadequately recorded. The walls are attributed on unconvincing evidence involving graves to period « IC » (*ibid.*: p. 26). It may be that further work with the archives will allow this situation to be clarified. All that we can be certain of at present is the fact that the structures lie at the juncture of Schmidt's periods « I » and « II ».

A third buttressed wall runs diagonally northwest-southeast into the baulk of DH 44. The orientation of this wall and the others mentioned show that the Painted Pottery Flat structures tend to maintain the same orientation already noted on the Main Mound and South Hill. The wall in DH 44 was also assigned by Schmidt to his « level 2 » and lies at the same depth as the walls in DH 34 just described. Another wall may also have been buttressed but it is difficult to read from the plan: it runs just below the center of square DH 35 and is drawn as a single line (Schmidt 1937: fig. 23).

No buttressed structures were evidenced on either Treasure Hill or Red Hill. In 1976 a single-roomed structure was still visible in CG 90 on Red Hill. It was made of bricks measuring 52 x 28 x 10 cm laid as headers. It was assigned by Schmidt to his period « IIB » but was not described (1937: 108). It contains no visible features.

Although the evidence reviewed is limited it seems possible to suggest that there did emerge at the site in the late fourth millennium B.C. a rather well defined tradition of masonry construction. This followed upon an earlier painted pottery period in which buildings were often made of packed mud, or *chimeh*, rather than brick. The houses being constructed in period « II »

appear to have been of roughly the same scale with a common orientation in relation to the direction of the prevailing wind. They all appear to have used a large central room as the main area with auxiliary storage rooms and areas added as needed. Often one of these additions appears to have been for grain storage. The occurrence of grinding tools indicates that each household prepared its own grain for cooking or baking. No evidence for animal enclosures occurs and one must conclude that some arrangement existed for keeping the animals in their own areas somewhat away from the houses.

At this time (3300-2900 B.C.), along with the emergence of the grey pottery in large quantity, mould-made bricks became common along with a sophisticated system of brick bonding and a variety of masonry styles which included the use of buttressed facades which characterize many of the buildings of this period. Subsequently, the general quality of masonry declined as seen in the abandonment of the complex buttress tradition and the reconstruction of walls with plain facades. Brick sizes gradually changed in the direction of longer rectangular forms. The remaining walls of period «III», with the exception of the Burned Building described below, seem to form less regular plans although their thickness on Treasure Hill shows that the buildings were substantial ones. One may speculate as to the possibility that the residential settlement of practicing craftsmen of period «II» may have given way in period «III» to a few dwelling places associated with a shrine center (the Burned Building) and its associated burial areas in the manner of some Sumerian centers, such as Eridu, Tell 'Uqair, and others. This suggestion must remain purely speculative at present and the fact that we can even wonder about it shows how poorly informed we still are on the settlement remains of period «III»! Little remains of the structures of this later time on the South Hill or the Main Mound which can be seen to form any set of coherent plans. Many walls on Treasure Hill would seem to belong to this period but only limited study was possible in 1976. The major preserved structure of period «III» date is the Burned Building on the North Flat and it is to that important area and structure that we now turn our attention.

The North Flat

The so-called «North Flat» of Tepe Hesār is of special interest due to the presence of the «Burned Building», one of the best preserved and best recorded structures excavated by Schmidt in the 1930s. The building has been the object of considerable interest to scholars as it represented for many years the only complete structure known in northeastern Iran in the Bronze Age. Yet the interpretation of the structure has been a matter of dispute, due in part to a lack of comparative data and, in part, to a lack of detail in its recording. Schmidt's architect had suggested a fortified structure (Schmidt 1937: 94); Schmidt (1937) and later Dyson (1972) argued for a rich merchant household; Mallowan (1965), largely on the basis of scale and a tripartite division of rooms, compared it

to a temple at Ashur; and Sarianidi (1977), on the basis of the skeletal remains and artifacts in their burned context, argued for a tomb burned with its contents. The published data was insufficient to resolve this discussion. What was the order of the tripartite construction? How long was the building in use before being burned? What was the true nature of the main entrance and the «tower»? What was the nature of the enigmatic stepped feature in the northeast corner of the main room? And finally, what was the stratigraphic relationship of the building to the North Flat and the sequence of remains of the site in general, and what was its absolute date?

These questions led us to spend a month remeasuring the structure, cleaning its masonry in detail at key points, and restudying plaster facings and other features. This work allowed us to augment Schmidt's original observations and led to the resolution of some of the questions mentioned above. At the same time, by cleaning the exposed unexcavated baulks to the east and to the west of the building we were able to trace the stratigraphy linking the building to the published plans of the North Flat, to obtain samples for radiocarbon dating, and to obtain samples of flint and lapis lazuli debitage and sherds from the deepest levels. By accident we found two burned rooms to the south of the Burned Building just below the surface. These were excavated and provided an important corpus of associated pottery from a closed architectural context. This corpus provides an important comparative assemblage in relation to most of the period «II» material published by Schmidt (1937) which comes primarily from graves.

The area called by Schmidt the «North Flat» lies at the northwestern corner of the Main Mound (Part I: fig. 2). The area formed an extension of the northern slope of that mound until it was cut off by the trench dug for the construction of the Tehran-Mashad railroad in 1936. Excavations carried out on the North Flat by Schmidt (1937: 177-178; figs. 104, 106) revealed an upper layer of mixed building remains, graves and objects of calcite/alabaster in uncertain context. These materials and wall fragments were assigned by Schmidt to his period «IIC». Below this «level» in squares CF 27, 37, and 47, and adjoining areas he discovered the «Burned Building» which he attributed to his period «IIIB». Below the main rooms of this building excavations were carried down to lower levels but were not recorded in the final publication. Nor were the results of the deep pit dug in CF 57 to the southwest. Thus, although wall remains in many cases were assigned period designations on the published plan (Schmidt 1937: fig. 106) supporting evidence in terms of pottery and artifacts, or in terms of recorded sections, was lacking. It was one of our objectives to provide the latter as well as we could by making observations in the field on those baulks still available for cleaning and drawing. Since the area is relatively dry, preservation was very good indeed, and has been aided by the formation of a salt crust over the surface which has protected it from further deterioration over the years. This stratigraphic study was very complex and remains to be drawn up for final presentation. We are able,

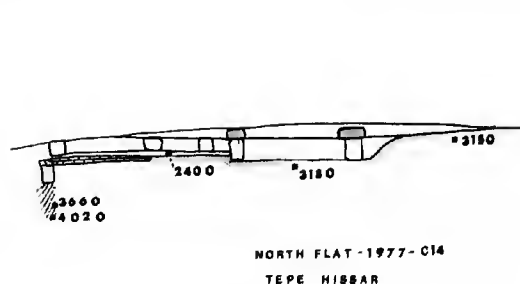


Fig. 13: North Flat, 1976: Schematic Section and Radiocarbon Dates, and Plan (after Schmidt 1937: fig. 103)

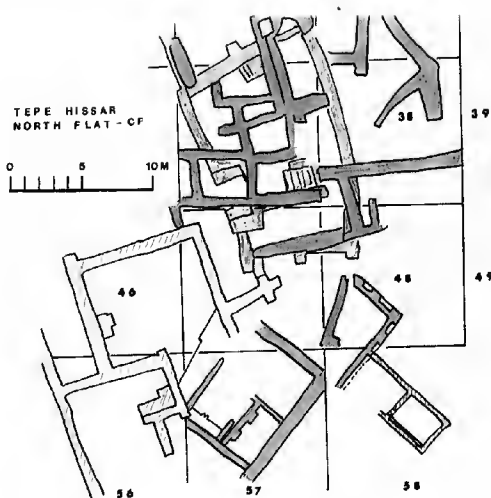
however, to present some of the conclusions in this preliminary report.

In broad terms, using the Burned Building as a major stratigraphic element, we were able to place other deposits above and below that structure (fig. 13). By doing this we arrived at four major phases which, for convenience, we will term A, B, C, and D beginning at the top with A, followed by the Burned Building as B, with C and D below.

North Flat: Phase A (Schmidt « level I », period « IIC »)

The topmost unit of the revised sequence, Phase A, is a stratum 0.20-0.40 m deep below the existing surface as seen in the unexcavated baulks of squares CF 28, CF 39, and CG 30. This deposit was called « level I » in Schmidt's field records, and was assigned by him to his period « IIC ». The architectural remains found in this upper level I (fig. 13) probably formed part of an upper stratum which originally sloped up to join the upper stratum on the high part of the Main Mound in DF09-CG 90 (see Part VI). This Main Mound stratum can be dated by carbon to sometime later than 2640-2390 B.C. (P-2618). Through the correlation of the typology of small finds and pottery from the Main Mound and Phase A of the North Flat with that of artifacts from the upper levels of Treasure Hill, Phase A can be estimated to date to around 2150-1885 B.C. (P-2620) on the basis of a radiocarbon sample taken from the equivalent stratum on Treasure Hill.

The architectural remains excavated by Schmidt in Phase A on the North Flat (primarily in CF 37; Schmidt 1937: fig. 132) were said to have contained examples of the calcite or alabaster discs and columns found elsewhere at Hissar only in graves or hoards of « IIC » date (Schmidt 1937: 216). Their occurrence on the North Flat may have been in association with architecture as Schmidt states, although the photographic record is less than convincing and they could just as easily have formed part of a buried hoard or a grave of which the skeleton had disappeared due to proximity to the surface. If the objects really were in an architectural context the occurrence raises the question of the functional nature of the structure with which they were associated. Unfortunately, that structure has long since been removed except for two small patches of brickwork still visible on top of walls of the Burned Building. As the original plans of this level were poorly



drawn, little can be said about it, or about the validity of the stated association. It may be noted, however, that comparable calcite/alabaster objects have now been reported from Tureng Tepe (Deshayes 1976: fig. 1), Altyn Depe (Masson 1976: fig. 5), Namazga Depe, Shor Depe and Ak Depe (V. Masson, personal communication reported in Dales 1977: 25), and Sahr-e Süxtah (Tosi, reported in Dales, *op cit.*). Some of these finds were in association with building remains which may be religious in nature.

The Phase A upper stratum of half meter or less of decayed mudbrick debris apparently covered most of the North Flat. Fragmentary walls still exist on the surface of CF 58 over the buttressed building of that area (see below), and in CF 39 where a rectangular kiln structure (fig. 14, Schmidt 1937: fig. 103, area S18) remains standing over older walls which were not assigned a date on the published plan. These can now be seen to belong to our Phase C (approximately IIB

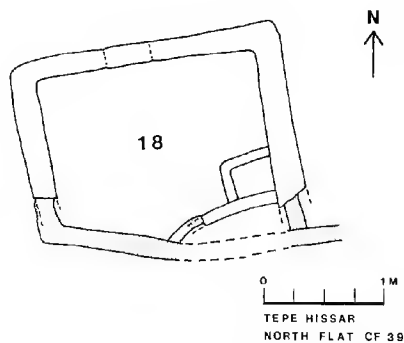


Fig. 14: North Flat, 1976: Plan of Kiln CF 39 / 18.

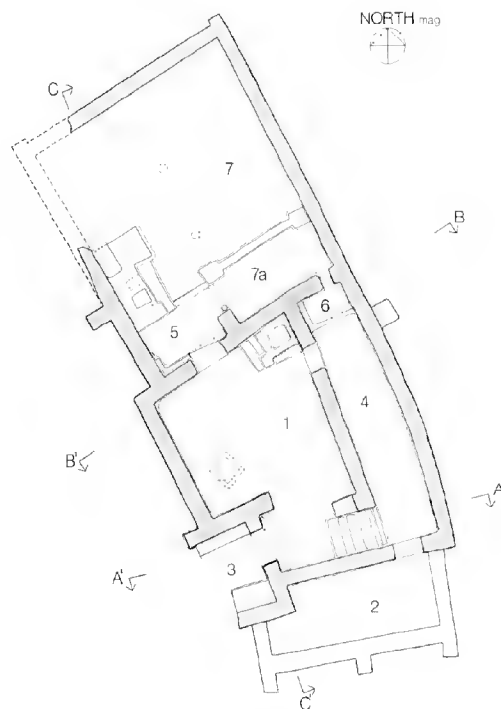
in Schmidt's terms). The use of phase designations is preferred at the moment since Schmidt's terminology is defined only by his stylistic arrangement of grave groups and can only be used, therefore, in the most tentative way when discussing the stratigraphy of the occupational sequence. Eventually the validity of his periodization will have to be tested against the actual stratified remains.

The S18 kiln of Phase A (« IIC ») is preserved on three sides, the southern wall having now largely disappeared. The structure was sub-rectangular with the interior measuring about 3.15 m east-west and 2.35 m north-south. The latter measurement is a minimum one as it is taken only to the southeast corner of a small bin located in the southeast corner of the kiln. The main wall at the east end of the kiln seems to have once extended beyond that point to the south. The eastern wall was built of rectangular mudbricks 60 cm long, laid as headers. The northern and western walls were made of similar bricks laid as stretchers with a width of 24-26 cm. In the south-east corner of the kiln was a small bin 48 cm², the only feature of the kiln preserved other than a round opening with a diameter of 82 cm in the northern wall 1.20 m from the northwest corner. This opening faces the direction of the prevailing wind and is burned bright red around the edges. No other features were recorded by Schmidt or remain visible today; the floor had been removed by deeper excavation in 1932. This Phase A kiln would seem to be of the same general type already described in this report for Phase 2 of DF 88/89 on South Hill (Part V) which has been roughly equated to Schmidt's period « II ». Thus it would appear that this type of kiln provided an element of technological continuity in the town through periods « II » and « III ».

North Flat; Phase B (Schmidt's « Burned Building », period « IIB »)

The Burned Building was constructed by cutting its foundations on the east and south sides into a pre-existing slope of Phase C date. The southeast corner of its foundation trench was first identified in 1976. It seems probable that the presence of the higher mound to the east explains the long unbroken eastern wall of the building (fig. 15).

The Phase C mound lying adjacent to the Burned Building on the south was dated in 1976 to the late fourth millennium B.C. by carbon samples recovered from two burned rooms in CF 58 (see below). Directly below rooms /1/, /2/, and /4/ of the Burned Building itself, two earlier building levels had been partly exposed by Schmidt but were never published. A radiocarbon sample associated with the uppermost of these early building levels gave a date of 3355-2955 B.C. (P-2617), indicating that the Burned building had been constructed directly over the levelled remains of the older abandoned Phase C mound. This dating was supported typologically by objects in a burial (CF 48 B1) dug into the top of this same debris and sealed by the base of the east wall of room /2/ of the Burned Building. The burial was furnished with a coiled copper bracelet (H76-27; cf. Schmidt 1937: Pl. XXVIII B, H 2170) and a grey burnished beaker (H76-28; fig. 16).



TEPE HISSAR DAMGHAN, IRAN
BURNED BUILDING III-B PLAN
UNIVERSITY MUSEUM 1976
VREISEN SURVEYOR
10 METERS

Fig. 15: North Flat, 1976: Plan of the Burned Building

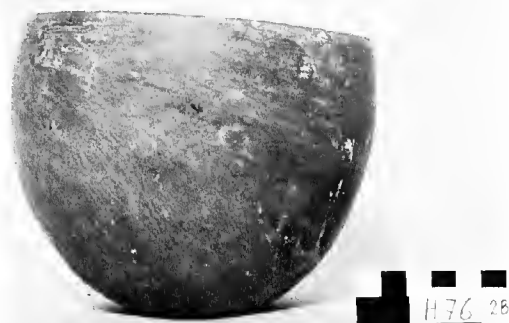


Fig. 16: North Flat, 1976: Burnished Grey Pottery Vessel (H76-28), CF 48 Burial 1



Fig. 17: North Flat, 1976: Western façade, north side of Entrance /3/, of the Burned Building showing subsidence

This vessel is identical to H 506 found in 1931 in DG 00, x-114, and assigned to «II».

The wall foundations of the Burned Building were laid down on a prepared level area and rested on a mixture of earlier wall stubs and soft grey ash. This latter substance proved unstable, and in the later years of the building's use the southwestern corner began to sink, a situation which necessitated the reinforcement of the main doorway (see below). The effect of this subsidence is clearly demonstrated in the spreading and downward tilting of the brick masonry in the western facade just north of the doorway (fig. 17). Contrary to Schmidt's assertion that only room /2/, the southern storeroom, was provided with a brick flooring (1937: 168-9), it would seem that the soft ash below required a more substantive surface throughout the structure. Careful re-examination of the remaining flooring around the sides of the other rooms shows conclusively that every room once had a flooring of two or three courses of brick laid down after the walls had been constructed. The bricks used in construction were carefully made in wooden moulds and, where not deformed by compression from subsidence or torsion due to the collapse of the building, measured regularly 60 x 32 x 10 cm with variations probably due to the use of more than one mould of 62/64 x 32/34 x 8/10 cm. The bricks were laid up as headers, each course lapped one-half brick over the one below and bonded at the corners as alternating headers and stretchers.

Measurements of wall widths vary according to whether plaster facing is present or not (a fact

unfortunately rarely noted in published reports of room measurements and almost never indicated on plans, although the continuity of plaster lines and layers and their number constitute important data on the history of structures). Basically wall widths are a function of brick size, in this case normally 60 cm with bricks used as headers. However, this «brick wall width» is modified by up to 5 cm of plaster on each face. The plaster is applied in one or more coats (representing periodic renewals) and makes a variance in «finished wall width» of up to 10 cm depending upon the state of preservation. Examination of the building materials used in the Burned Building showed that they were prepared with great care in a more consistent fashion than seems to have been the case with other structures examined at the site. The mortar, which was spread horizontally, and occasionally vertically, between the bricks, consists of a very clean, fine sandy clay which tends to dry and crack in hard lumps. It contains no visible tempering matter. The sundried mudbricks appear to have been prepared from sandy clay with the inclusion of chaff, as they exhibit grass impressions up to 10 cm in length. The plaster facing of the walls, door jambs, and other features, on the other hand, is a silt-like clay tempered with fine pieces of chaff only 1 cm or less in length – probably either chopped straw or dung. No traces of lime plaster or wall painting remain, although the walls showed evidence of numerous replasterings which we cut back for examination.

When originally constructed the building consisted of rooms /1/, /4/, and /7/ with the main entrance, /3/, at the southwest corner (fig. 15). It would appear that

features 1a and 1b of room /1/ (the platform and the stairway), were also original to the buildings, as no doubt was the oven-block in room /7/. In a second construction stage, or in a second stage of building use, the grain room /7a/, the grain bin /6/, the south storeroom /2/, and the entrance reinforcement /3/, were added – perhaps at separate times or perhaps all at one time. Most complex building plans of this kind as a rule exhibit some degree of change during the occupation of the building. For the archaeologist the problem of interpreting such a plan is one of measuring microchronometric changes since masonry disjunctures may represent only short-term construction stages and not major time lapses. On the other hand, such changes may have real chronological significance. In the absence of vertical stratigraphy the architectural evidence provides critical information although the problem of such horizontal chronology has received little attention from field archaeologists.

In addition to the secondary construction elements mentioned above the door leading from the top of stairway 1b through the wall into storeroom /2/ seems also to have gone through two stages of use. It will be recalled that Schmidt found the storage jars in room /2/ sitting on a secondary level some 35 cm above the paved floor (Schmidt 1937: 168). The rebuilt doorway may well relate to this secondary level. Unfortunately, there is no way at present to be certain whether or not these various secondary changes represent a single renovation of the building although that possibility is a real one. What is certain, however, is that after these changes had been made an additional series of « western enclosures » or compounds were constructed adjacent to the Burned Building on level land in squares CF 46, 47 and 56 to the west (fig. 13). These walls, which abut the southeast corner of room /2/, rest on a layer of fine grey ash which lies against the lower portion of the room /2/ wall and is thus contemporary with its early use. Charcoal from this layer provides a date of 2420-2290 B.C. (P-2701). This is the only radiocarbon date so far available which is directly associated with the Burned Building. It confirms its stratigraphic position as earlier than Phase A and later than the underlying mound of Phase C date. It unfortunately gives us no indication as to the length of the use of the building but certainly it would be 50 to 100 years without any problem given its well-built walls and the careful maintenance it received. Thus, it could have lasted to the beginning of the final phase of cultural development at Hesār.

The main entrance, /3/, was represented on Schmidt's original plan as having a solid block of brickwork on its south side. This brickwork was interpreted as a tower base (1937: 169, tower 8, and fig. 91) although it stood only 60 cm above the entrance floor and measured only 1.54 m from front-to-back and 1.5 m from side-to-side. The cleaning of the masonry carried out in 1976 showed conclusively (fig. 18) that there was no tower construction here as interpreted (quite out of scale) in the architect's drawing (Schmidt 1937: fig. 94), nor was there a deep doorway with the side benches as recently suggested by Dyson (1972: 65 and fig. 20, p. 118). Instead, there had been

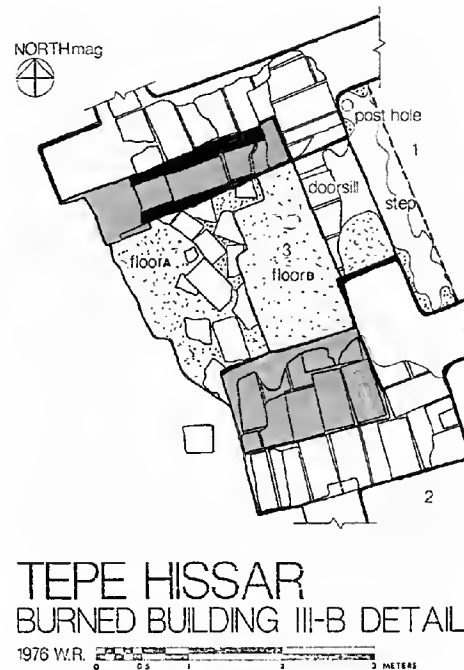


Fig. 18: North Flat, 1976: Plan, Entrance /3/, the Burned Building

a deeply inset doorway with an original floor. After some years the structure had begun to sag due to the gradual compression of the soft ash below. As a result, the upper side walls of the entrance apparently began to tip toward each other threatening the stability of the doorway. This development is quite clearly demonstrated by the vertical depression of the horizontal lines of the brick courses and by the lateral spreading of the vertical joints in the west wall (fig. 17). In an effort to buttress the side walls two blocks of brickwork were set against the base inside and a second floor was laid down (fig. 18).

In the main room, /1/, a major puzzle has been the function of the so-called « stairway 1a » feature, a curious structure with two steps, a side niche and, originally, five cut-out elements (fig. 19) which reminded Schmidt of seated female figures (Schmidt 1937: 165 and fig. 93). As in the case of the entrance, the detailed articulation of the brick pattern through careful cleaning made the nature of the structure apparent (fig. 20). When excavated in 1932 (as may be seen in Schmidt 1937: fig. 93) the top of the feature had been exposed only to the level of the two enclosing room walls. In the forty-four years since then the uppermost course of brickwork on these walls had disintegrated. The cleaning of the next course of preserved brick in 1976 revealed that the so-called « stairway » had been a low platform supporting an open hearth 70 cm² enclosed on four sides by an edging of brick (fig. 21).



Fig. 19: North Flat, 1932: Mud Plaster Decoration, Platform Hearth, Burned Building / I/



Fig. 20: North Flat, 1976: Cleaned Platform Hearth, Burned Building / I/ (looking west)

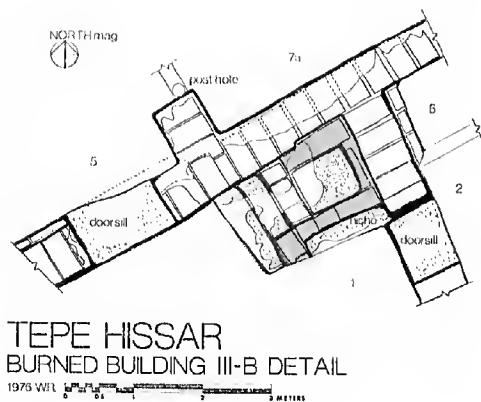


Fig. 21: North Flat, 1976: Plan, Platform Hearth, Burned Building /I/

The edging course had been at the same height as the surrounding room walls when excavated and the center of the hearth had never been cleaned out. The hearth was lined with plaster as shown by the upturned plaster edges, and had a pebble floor coated with plaster which had been fired bright red. The hearth platform and brick edging measured 1.48 m front-to-back and 1.68 m side-to-side. The «steps» at the front probably

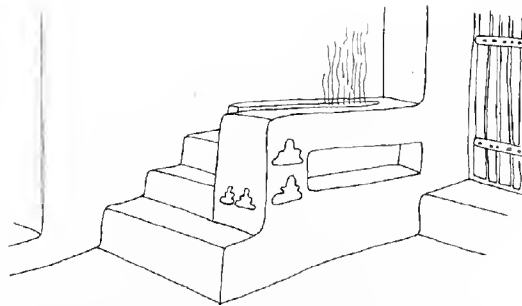


Fig. 22: North Flat, 1976: Reconstruction, Platform Hearth, Burned Building /I/

served as ledges on which to place vessels or small objects, as no doubt did the niche along the south face. The whole feature gives the appearance of a special installation of complex purpose (fig. 22).

This «platform hearth» is at present unique at Hissar, both in terms of its structure, its placement in the room, and its decorative features. It is certainly distinct from the semi-square floor-level heating hearth (fig. 23) with its low side curb walls as found in room /I/ and elsewhere, and from the «oven-block» of brickwork with its firing box with round central support column and adjacent baking chambers as seen in room



Fig. 23: North Flat, 1932: Floor Hearth, Burned Building /I/ (looking south)

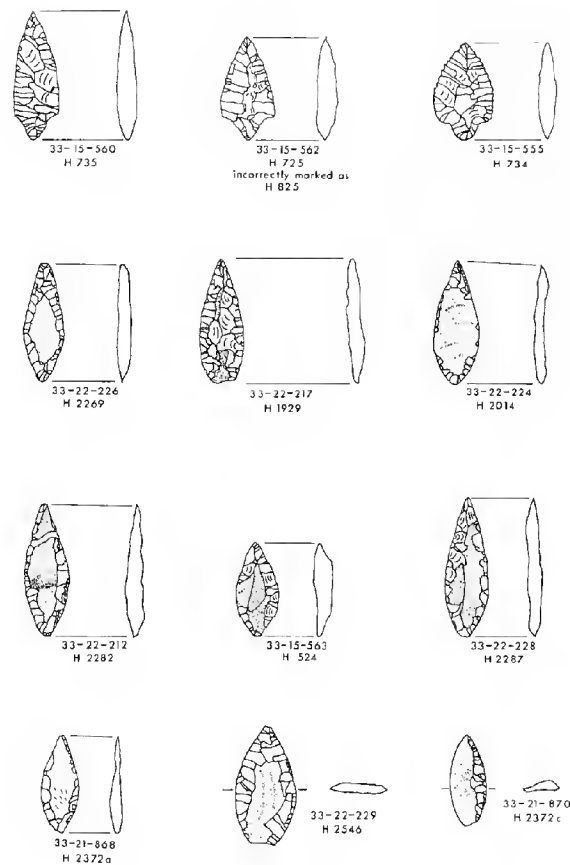
/7/. Floor hearths appear in South Hill in period «II» while oven-blocks appear to have been more common, on the North Flat in period «III» areas.

The so-called «oven-block» in room /7/ consists of a large block of brickwork 2.06 m wide at the north end, 3.81 m long from north-to-south, and 1.88 m wide at the base at the south end. The block is set against the inside face of the west wall of the room and is preserved to a height of 89 cm above the floor at the southeast corner. Along the east side is a narrow bench behind which, in the center, is a 22 cm wide opening into a small firebox (62 x 56 cm) which once held a clay column 20 cm in diameter in the center (cf. the firechambers recorded in DG 20 level 1, period «IIIC», of the Main Mound; Schmidt 1937: fig. 84). At a height of 36 cm above the base of the firebox, on either side of it, lies a flat surface of pebbles covered with clay burned black and red. Each of these areas covered an area of about 50 cm² and appeared to have once formed baking surfaces – probably in enclosed chambers which have now disappeared. The northern face of the oven-block (shown in Schmidt's 1937 fig. 90 with a square cut-out area next to the adjoining west room wall) originally ran across as an unbroken structure. Schmidt stated that «the western continuation of this block is uncertain». The fact that it did continue may be ascertained without question from the existing plaster lines in the floor. The error was one of excavation: the cut-out area resulted from the technique of wall tracing by trenching along the wall face – a technique used in the 1932 excavation to speed work, clearly visible in published photographs (e.g. Schmidt 1937: fig. 89). The exterior faces of the brick block, itself formed by parallel rows of bricks set as headers against the west room wall, still carry some 14 cm of layered mud plaster which represents at least ten replasterings and probably more given the difficulty we had in separating the layers for counting. Since the interior walls of rooms are covered with only 4.5 or 5.0 cm of plaster this exceptional thickness on the oven-block seems unwarranted unless this feature was exposed to the outside weather and required more frequent renewal. That such could have been the case is suggested by the unusual width of «room» /7/ (8.25 m). No real postholes were found in this room although two «depressions» were located by Schmidt in the center toward the oven-block. These depressions may have indicated the position of some sort of shallow-based supports for a half-roof or sun shade over the work area in an otherwise open courtyard. Such courtyards are quite common in traditional modern houses. Schmidt's own thoughts along these lines are indicated by his crossed-out field notes (University Museum Archives): «The absence of holes once containing the bases of central roof supports is strange considering the large size of room 7. The trunks of poplars only can have spanned this distance between walls». In the final publication this thought was restated as «although no post remains occurred in these two depressions, we assume that the base of roof supporters stood in them». It is perhaps worthy of note in relation to this question of roofing that the floor, exterior walls, and the oven block in room /7/ lack evidence of heavy

burning such as is present in all of the narrower rooms which clearly were roofed.

The only area of room /7/ that was burned was a strip along the southern wall near the «creephole» which opened through the wall into the «wheat» bin, /6/. The cleaning of room /7/ in 1976 revealed an area of plaster floor burned black to a distance of 2 m from the south wall. At this point the color stopped abruptly at a line of layered plaster turning upward. This line, as the cleaning revealed, was the south face of a secondary partition wall which had been constructed parallel to the south wall of room /7/ starting from the room's east wall which it abutted (fig. 15). The resulting floor plan reveals that the partition wall, which had been stabilized by a square brick pier at either end, formed a narrow rectangular room, /7a/, entered by a door at the west end. This room was connected to the grain bin, /6/, by the «creephole» in the south wall. No doubt the blackened floor was caused by grain burning in the enclosed space during the fire which destroyed the building. The restored plan now explains the enigmatic presence of the posthole next to the east jamb of the doorway leading into room /1/. This posthole once held the post on which hung the door which closed room /7a/. The cleaned floor of room /7/ showed that the partition wall had been formed of a single row of five standard-sized bricks (60 x 32 cm) laid as stretchers between two square stabilizing brick piers. The wall stub was unburned on top. The upper brickwork had broken off at the floor level when struck by the upper south wall which collapsed northward with the burning of the building. Schmidt recognized the resulting jumble of brickwork (Schmidt 1937: fig. 90) which he interpreted as the fallen south wall (*ibid.*: 167). The so-called «creephole» was in fact a porthole 35 cm high and 44 cm wide. The grain bin, /6/, was built inside the north end of storeroom /4/. The west and south sides were formed by a lining of bricks 10 cm thick set on edge as stretchers. The east wall was faced with bricks standing on end against the wall face. These lining bricks sat on a floor formed of two layers of brick. The north-south interior measured 1.04 m while the east-west measurement was 1.6 m. It is possible that the rear (south) wall of the bin was low enough to allow it to be filled from stores in room /4/. Apparently the grain was removed as needed with a scoop through the porthole into the adjoining /7a/ room, for use in baking done in the oven on the oven-block of room /7/. The inside walls of the bin, the floor, and the porthole, were covered with several layers of mud plaster to a thickness of 10 cm.

The question of the functional nature of the Burned Building remains. The possibility of a religious function must be seriously considered in view of the unique richness of the artifacts found in the building (Dyson 1972), the special care taken in its construction, and the uniqueness of its plan and features in contrast to other known buildings at Hesār. The efforts made to extend its period of usefulness and the addition of large enclosed areas to the west indicated that it had a long history with a growing importance. In view of the unique platform hearth with its stepped niches, of the



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Fig. 24: Hesār, 1932: Arrowheads: DF 09 Burial 1 (top row); Burned Building and adjacent areas; and FD 16 (H 524). (University Museum numbers)

presence later in the same area of the discs and columns and, as we shall see, special small objects in an earlier context in the same area, it is difficult not to speculate that the area may have been holy ground and that the structure may have been some sort of small shrine with many of the characteristics of a household. If true, Mallowan (1965) may have been correct as to its religious nature, but for the wrong reasons, since the history and planning of the building in no way resemble that of the Ashur temple to which he compared it.

In the end, as its name indicates, the building was destroyed by fire. All of the interior walls and plaster of rooms /1/, /2/, /4/ and /7a/ and areas /3/ and /5/ were burned bright red. The building collapsed westward and northward burying the contents and a number of bodies inside. We are told that great numbers of arrowheads were scattered about, especially in the south end of room /1/ inside the entrance (Schmidt 1937: 164), and that in room /7/ that «some arrow-

heads » occurred in the thin burned layer (*ibid.*: 167). Schmidt also states that hundreds of flint arrowheads occurred in the Burned Building or its vicinity (*ibid.*: 219). During the cleaning in 1976 we located three more on the floor of the entrance (H76-10-12) and one unstratified in CF 46 (H76-13). These are all of the bifacially flaked lanceolate type and document their occurrence on the floor of the structure.

Excavations carried out between June 1 and 12 in 1932 encountered a number of the same type of arrowhead from areas outside the Burned Building itself. These were largely catalogued at the time as belonging to «level 1» («IIC» or in «level 1-2» refuse (fig. 24). To the west of the main building finds were made in CF 45 (H 1816), CF 46 (H 1800, 1804, 1817, 1883-86); CF 47, northwest quarter outside the entry to the Burned Building (H 1952, 1969, 1970); to the south in CF 47, southeast quarter (H 1887, 1888) and in the higher part of the «level 2» debris

(H 1924-37); to the east in CF 38 (H 1976, 1996, 2014). Over the area of Stairway 1b in room /1/ (H 1880) and in the room itself (H 1903, 1904) in CF 37. Finally, at the level of the «alabaster room» in the northeast corner of CF 37 (S 1) two examples were reported (H 1967, 1968). In the final report Schmidt attributes all of these to the Burned Building and does not mention them in his discussion of «IIC» remains on the North Flat. Since the western enclosure walls of the building largely encompass CF 46 those items may well have been in the fill associated with those walls (although it is well to note that higher walls existed as indicated in the section). Nevertheless, the arrowheads appear to have been rather widely scattered and quite high in the fill – in effect overlying the collapsed burned structure as much as occurring at floor level within it. This distribution pattern is difficult to understand. It has been suggested that the arrowheads were purposefully scattered over the area after it had been burned as a tomb. That remains a possibility.

Additional arrowheads were registered on July 6th 1932 from «level 1» (CF 28, H 2282; CF 37, H 2269); CF 38, H 2272; CF 48, H 2267, 2268); and CF 36, H 2590, 2591). From «level 2» the Burned Building level, arrowheads were recorded from room /1/ (CF 37, H 2287, 2372, 2373); room /2/ (CF 37, H 2285); room «9» (CF 27, H 2280); room «11» H 2281, 2296, 2297, 2305). The location of a room 9 or 11 is nowhere indicated for CF 27, so that it is uncertain what locations are intended.

Flaked stone arrowheads have been recorded at Hesār in five contexts other than the North Flat (four on the Main Mound, CF 97, DF 18, DG 01, and DG 20; and one on the Painted Pottery Flat, EH 13). A review of these occurrences with our additional dating evidence allows us to fix their order somewhat more firmly in time.

The earliest arrowheads (H 4823 and H 4824) were found at -7.7.5 m in EH 13 at the southeast corner of the Painted Pottery Flat. They occur in period «IA» debris (Schmidt 1937: Pl. XVII). They consist of trihedral flint blades which have been retouched on one face along each side to form a roughly lozenge-shaped point. The technique is totally unlike that used for the later arrowheads which are bifacially flaked. The same type of early arrowhead occurred in the northwest quadrant of CG 95 in burial x-7 (Schmidt 1933: Pl. XCIIID). The arrowhead (H 911) lay at the left wrist of an adult male skeleton which was found at a depth of -95 cm and which was dated to the end of the painted ware period, «IC-IIA». Other items in the grave were personal ornaments: a necklace of white frit beads (H 909), white and black beads below the right pelvis (H 910), and a bracelet of white beads on the left wrist (H 912). A dog's (?) skull lay near the right knee.

The second, bifacially flaked, type of arrowhead appears in period «III» contexts. In DG 20 an elliptically shaped example (H 1813) was found in room 5 of «level 1-2». This stratum lies immediately below that for which a sample produced a date of 2640-2390 B.C. (P-2618). Level 1-2 DG 20 lies near the level of the top of Building 3, in DG 01/11. Building

3, was a reconstruction of Building 3a which was dated to 3360-2995 B.C. The context of the arrowhead thus should probably lie in the second quarter of the third millennium B.C. A second arrowhead (H 2546) was found just below floor level in Building 3, in the topmost fill of Building 3a and belongs to the same general time range. In the same general horizon on the west of the Main Mound were found H 606 (DF 18) and H 3071 and H 3103 (CF 97). H 606 (Schmidt 1933: Pl. CXLIIIA, 431) was found at a depth of -1.55 m, 20 cm below burial x-29. It is called «obsidian» in the preliminary report (*op. cit.*), «chalcidony» in the Field Catalogue, and «flint» in the final report catalogue (Schmidt 1937: 396). The context is described as «doubtful Hissar IIIB refuse» (*ibid.*: 220). The shape of the arrowhead is that of an elongated isosceles triangle with slightly incurved based. The term «notched» used by Schmidt to describe it gives a false impression as the incurve is very shallow. The general stratigraphic level places this item in the same zone as that just described and it should have a comparable date, i.e., between Building 3a and the DG 20 carbon date. The depth of discovery places the object at the top of the ruined wall (overlain by burial x-16) in the southeast corner of DF 18. This wall abuts the upper part of Building 2, further east and is overlain by fill penetrated by later graves of «IIIB/IIIC» type.

In CF 97, northwest of DF 18, two lanceolate arrowheads (H 3071 and H 3037) were found in the fill of the southwest quarter and «low in room 2». Objects are first listed in the Field Catalogue on August 27th using general area terms like southwest quarter, etc., as customary for beginning squares when no architecture was yet defined. By August 29th when the arrowheads were listed room 2 had become apparent. By August 31st rooms 2 and 3 are mentioned. Unfortunately no room numbers appear on the published plan and the working plans of the architect on which his locus numbers must have been noted are nowhere to be found. It is obvious, however, that the first rooms to be numbered must have been near the top of the excavated area and certainly belong somewhere in period «III».

Finally, a stemmed form of the bifacially flaked arrowhead (fig. 24) is documented in burial DF 09 x-1, the so-called «Second Warrior's Grave» (Schmidt 1933: Pls. CLII, CLIIIB, 444). Fourteen arrowheads were found (H 721-723, 725, 727-737; *ibid.*: Pl. CXLIIIA), formerly attached to wooden, not reed, shafts traceable for a length of 45 cm. They lay parallel to the right side of the body. Funerary offerings included numerous items of alabaster/calcite and the grave dates without question to Schmidt's period «IIIC». It was dug a meter or more down from the surface of DF 09 which is essentially the surface of the present pinnacle in the master section for the Main Mound (VI: fig. 2). It was, therefore, dug into the strata of Phases B and C of that sequence, probably from Phase A which dates of the end of the third millennium.

The combined evidence then indicates that a form of crude arrowpoint made on trihedral flint flakes was in use throughout the painted pottery period. It occurs rarely and may well have been used primarily away



Fig. 25: North Flat, 1976: CF 58/2 (foreground) and 58/3 (background) (looking south)

from the settlement for the hunting of small game and birds. For the following early grey ware period, period «II», there is at present no evidence for the use of arrowheads. Bifacially flaked arrowheads do occur, however, throughout period «III» with elliptical and lanceolate forms early, and stemmed forms late. These arrowheads would appear to have served as weapons in contrast to the earlier ones.

North Flat: Phase C (Schmidt's period «IIB/IIIA»).

To the southeast of the Burned Building, underlying remnants of Phase A walls on the Phase C mound, lies the corner of the buttressed structure already described as CF 48/14/. As noted earlier, this facade duplicates similar walls on the Main Mound dated to 3380 to 3155 B.C. The CF 48 structure has a date of 3000-2855 B.C. (P-2706). While attempting to trace the plan of this structure, a slightly later set of overlying walls was discovered virtually at the surface (fig. 9). This later structure was excavated by our Iranian colleagues Heydeh Eghbal and Hasan Talai. It consisted of two rooms, CF 58/2/ and 58/3/, which had been destroyed by fire (fig. 25). Charred roof beams produced the following carbon dates: room 58/2/: 3165-2905 B.C. (P-2615); room 58/3/: 3040-2880 B.C. (P-2698) and 3170-2915 B.C. (P-2700). The burned debris of these rooms allowed a detailed reconstruction of the roof structure since the material had burned and fallen directly down remaining in position. Charred wooden beams 10 cm in diameter lay across the short east-west span of the

rooms (2.5 m) and were spaced roughly 40 cm apart. On top of these beams smaller wooden pieces 5 cm in diameter lay lengthwise (north-south). Over these in turn lay a layer of reeds on top of which rested a layer of clay 4 to 6 cm thick. The fired pieces of this clay showed the impressions of jointed reeds with vertical striations on the surface. The reeds ranged in diameter from 4 to 15 mm with most of them measuring 5 to 7 mm. At the present day jointed round reeds with feathery tops grow in naturally available water east of Bag-e Badur, a village about four miles southeast of Hesar. A handful of these reeds ranged in diameter from 6 to 9 mm when collected in 1976.

Cut into the burned debris of CF 58/2/, at a slightly later date, was a grave (CF 58 B 1) which contained a short-necked black bottle (H76-75) and a grey beaker (H76-41) (fig. 26). The two forms may be compared to generalized bottle-pitchers and a beaker of «IIB» type (Schmidt 1937: Pl. XXXVII, bottle forms; Pl. XXXVIII, H 3967, a beaker). This grave, intrusive into the dated context of the room, may well belong to the early part of period «III» when the abandoned area appears to have been used as a burying ground.

The first of the two burned rooms, CF 58/2/, measured 4.10 x 2.50 m and contained rather simple furnishings which included a grinding stone (H76-130), three handstones (H76-132-134) and a polishing stone (H76-N112) along with a pottery figurine fragment (H76-N104) and a miniature clay basin (H76-79). Pottery vessels (fig. 27) broken in the fill included a globular jar with missing rim (H76-85), a globular

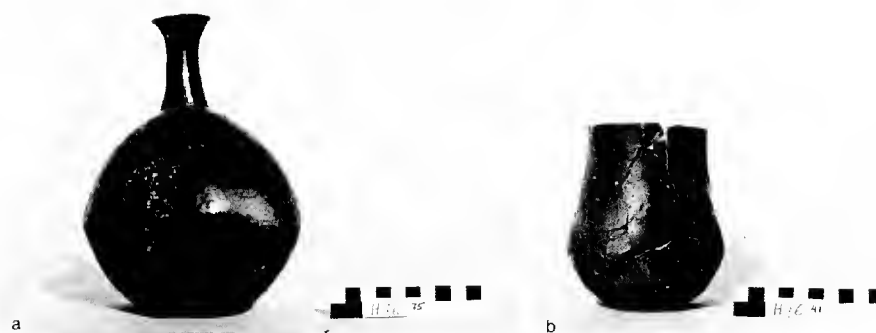


Fig. 26: North Flat, 1976: Pottery Vessels from CF 58 Burial 1

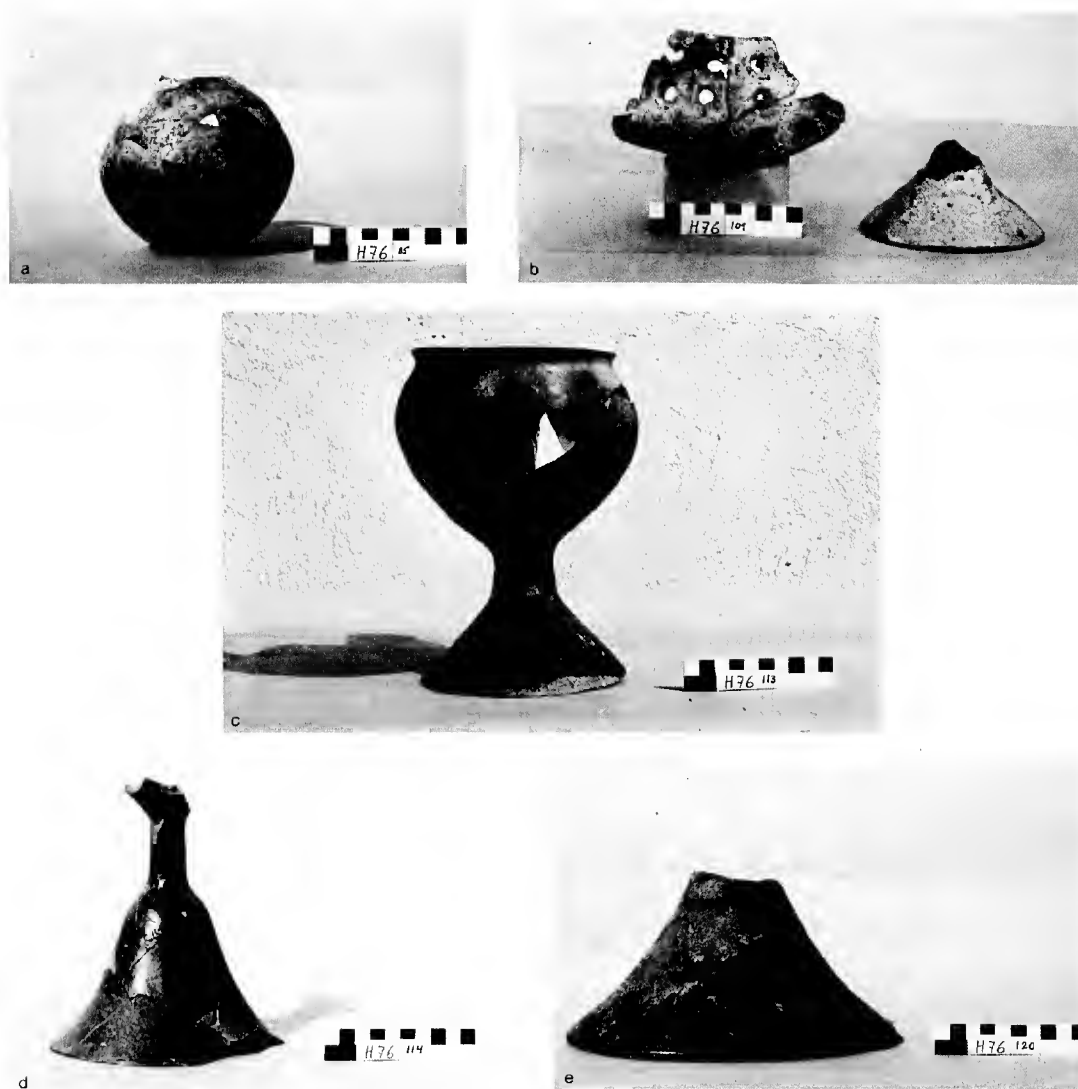


Fig. 27: North Flat, 1976: Pottery Vessels from CF 58 /2/



Fig. 28: North Flat, 1976: Burnished Pottery Figurine, CF 58 /3/, H76-76

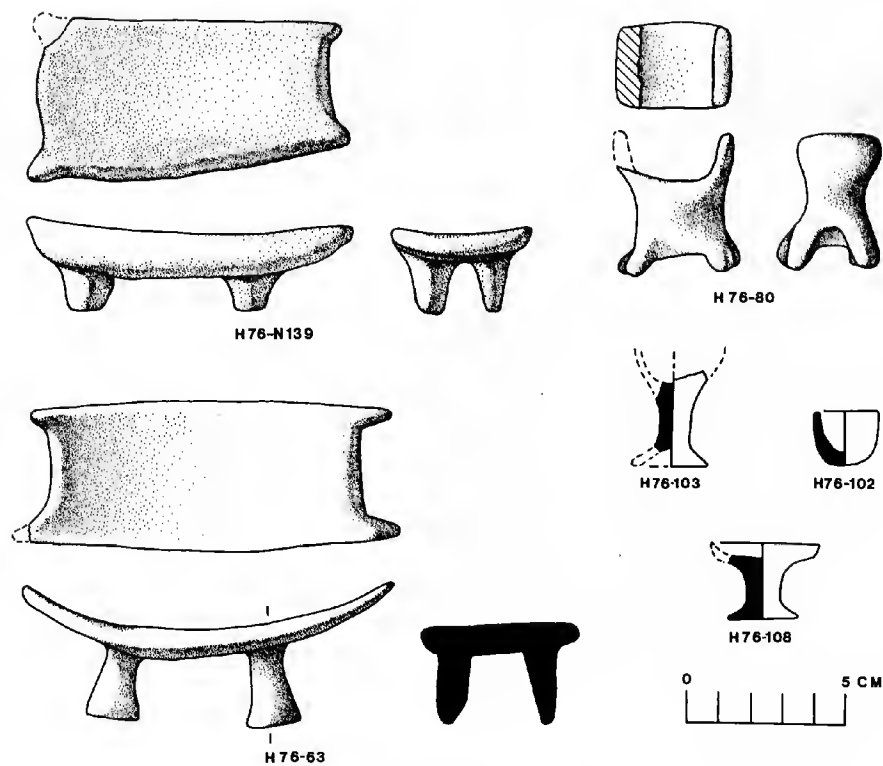


Fig. 29: North Flat, 1976: Miniature Pottery Objects, CF 58 /3/

bowl on a pedestal base (H76-113), a flaring-sides chalice (H76-114), a chalice base (H76-120), and a coarse ware brazier (H76-109).

The second room, CF 58 /3/, 3.45 x 2.50 m, was entered through a small door 1.20 m wide in the southeast wall of room /2/ and had no outlet. The room was filled with broken pottery vessels which had apparently been standing on the floor at the time of

the fire and the burned roof debris. Aside from the pottery vessels the room contained two crude animal figurines (H76-56, N85), a pottery spindle whorl fragment and two pottery sherd discs (uncatalogued), a clay jar stopper (H76-N80), a crude human figurine (H76-50), and a finely burnished human figurine (fig. 28) without a head (H76-76). In addition a small group of miniature pottery objects (fig. 29) found scattered



Fig. 30: North Flat, 1976: Painted Pottery Vessel, H76-111, CF 58 /3/

on the floor: two model beds of a litter type with two handles at each end and four short legs (H76-63), a small stool (H76-80), a miniature bowl (H76-102), a miniature chalice (H76-103), and a miniature offering table with a flat top and pedestal base (H76-108). The room also yielded a small crystal pendant bead (H76-57). The burned and scattered bones of a small child (5 years or younger) were found mixed in the fill of the southeast corner of the room raising the question of whether or not the materials had been placed in the room for the purpose of burning it down – a practice already suggested by Sarianidi for the later Burned Building.

The pottery included a total of 31 vessels broken on the floor and scattered in the fill mixed into the

fallen burned roof beams and mud plaster. The vessels included one flat plate (H76-118) and two pedestal bases without tops (H76-119; discarded). Twenty-eight other reconstructable vessels were recovered. These vessels fall into three distinct size groups: small (4.0 to 9.3 cm in height); medium (19 to 29 cm in height); and large (36 to 40 cm in height). One additional vessel (fig. 30) stands alone with a height of 12.0 cm (H76-111). Vessels painted with brown geometric patterns on a matt buff ground occur only in the small size range (fig. 31) and consist of simple globular hole-mouth jars and pedestal-based bowls or cups (H76-58, 59, 64, 65, 77, 89). The remaining small vessels (fig. 32) include pedestal-based bowls with low everted rims, a flat-based bowl with flaring sides, and a flaring-sided chalice with pedestal base. These are fired to a plain light grey or tan-beige color (H76-55, 60, 61, 62, 66, 78, 81, 88, 112, 116, 139). The seven medium-sized vessels (fig. 33) include pedestal-based bowls and two bottle-pitchers with high necks (H76-82, 83, 127-129, 140, 141) made of fine burnished grey ware. A large open pot, 23 cm high, was made of friable coarse ware (discarded). The two largest vessels (fig. 34) were pedestal-based bowls of burnished grey ware and stood 36 cm (H76-110) and 40 cm (H76-84) high. The three globular jars with simple line patterns in brown paint (fig. 31) from room 3' occur in both « IIA » (Schmidt 1937: Pl. XXXVI, H 4755) and « IIB » (*ibid.* Pl. XXXIX, H 2212) context. A flat based bowl with straight everted sides and a turned out rim (H76-112) is identical to H 5189 in « IIB » (*ibid.* Pl. XXXVIII).



Fig. 31: North Flat, 1976: Painted Pottery Vessels, Small sized Group, CF 58 /3/ (left to right) H76-59, 64, 65, 89, 58, 77



Fig. 32: North Flat, 1976: Unpainted Pottery Vessels, Small sized Group, CF 58 /3/ (left to right) H76-55, 78, 66, 60, 88, 81



Fig. 33: North Flat, 1976: Unpainted Burnished Vessels, Medium sized Group, CF 58 /3/ H76-82, 83, 127-29, 140, 141

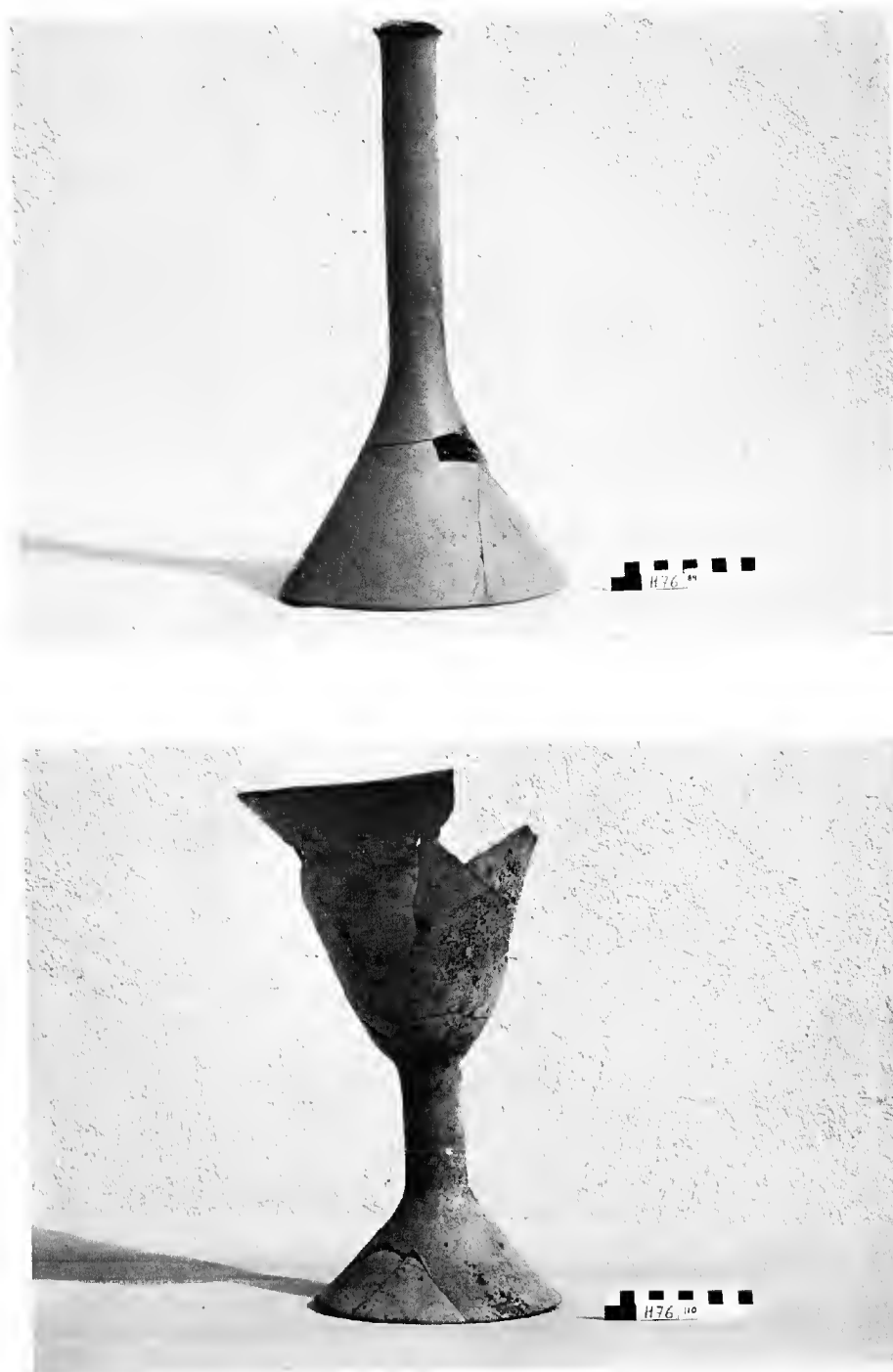


Fig. 34: North Flat, 1976: Burnished Grey Pottery Vessels, Large sized Group, CF 58 /3/H76-84. 110

On the other hand, twelve of the illustrated vessels are of classic period «II» type: H76-60, 66, 78, 88 are small sized variants of H 4767 (*ibid.* Pl. XXV); H76-82, 127, 129, 141 are variants of the same form in full size; H76-81 (small), 110 and 128 are the classic «chalice» (or «stemmed bowl») forms (*ibid.* Pl. XXV, H 2784 and fig. 32); and H76-84, a long-stemmed vessel, a type, said to occur solely in Hesār «II» (Schmidt 1933: Pl. CI, H 1622, 1648; and 1937: Pl. XXIII, H 4344, «IIA»). With these standard «IIB» forms occur a simple, tall-necked bottle-jar (or «bottle-pitcher») of «IIA» type (*ibid.* Pl. XXXVI: H 2164), and a bottle-jar with a notched neck of classic «IIB» type (Schmidt 1933: Pl. CXIV, H 651; 1937: Pl. XXXVII, H 2227).

All of these types occur together in a closed stratified context. They are firmly dated by radiocarbon to 3170-2880 B.C. and by stratigraphic position. It is thus established that the bottle-jar, considered as the classic type for the identification of period «IIB» was already in existence at this early date and cannot, *by itself*, be used to date graves or levels to a later period. This circumstance makes it apparent that the sequence of associated forms in the occupation levels differs to some degree from the seriation developed by Schmidt on a present-or-absent basis for the graves. It will, therefore, be necessary to differentiate between his ceramic grave «groups» and associated ceramic remains in stratified sequence. An independent descriptive sequence of ceramic remains is now being prepared by Susan Howard for the Main Mound. Eventually, a re-evaluation of the grave groupings will be needed to relate the two.

North Flat: Phase C in CF 46-47, 56-57

As previously noted, to the west of the Burned Building lie several large enclosures (containing what are probably additional oven-blocks) built late in the history of the Burned Building and attached to a wall at its southwestern corner. Immediately below the attached wall lies a grey ash stratum which runs up against the Burned Building and which overlies the earlier remains of Phase C date in CF 46-47 and 56-57. The area marked on Schmidt's sketch plan as CF 57 /16/ was excavated to between one and two meters below this layer revealing various earlier walls. One of these walls lies immediately below the ash and runs diagonally across the northwest corner of CF 57. This «diagonal wall» appears on the plan (fig. 13) only as a single line in the extreme corner of the square and runs under the enclosure walls in CF 47 and 56 at either end. The overlying grey ash stratum, as indicated above, should date to either 2420-2290 B.C. (P-2701). The bricks in the enclosure walls associated with the Burned Building above the grey ash layer measure 60 x 32 x 10 cm and are laid as headers as in the Building itself. The bricks in the diagonal wall immediately below the ash layer measure 60 x 30 x 10 cm and are also laid as headers thus indicating that both brick size and construction method were in use sometime prior to the construction of the Burned Building.

Immediately below the diagonal wall in the northwest baulk of CF 57 lie the remains of the corner of

a room which marks a significant change in masonry style – a change which characterizes most of the visible wall remains in the lower part of the square. The size of the bricks becomes shorter, 50/52 cm in length (10 cm thick), and they are now laid as stretchers. Charcoal from the floor of this partly preserved room produced a corrected date of 3160-2900 B.C. (P-2704). Other walls visible around the sides of the square which predate this room are made of bricks measuring 50 x 29 x 10 cm and 52 x 26 x 10 cm laid as stretchers or in alternating courses of headers and stretchers and are very well preserved. In the southwest corner of CF 57 /16/ two small walls form a rectangular room which is visible on Schmidt's plan (fig. 13). A small niche in this room wall produced a date of 3355-2945 B.C. (P-2699). Thus the structures below the diagonal wall, below the Burned Building, and the burned rooms in CF 58 all fall fairly close in date indicating a relatively rapid build-up of the mound in this area at the end of the fourth millennium B.C.

North Flat: Phase D (Schmidt period «IIA»)

On the west side of area CF 57 /16/, in the baulk, the base of the lowermost west wall rests on a deep deposit of grey ash and trash (Phase D) which slopes downward from north to south. A small test trench a meter wide and about two and a half meters long was sunk into this deposit in 1976 to a depth of 2.25 m below the wall base. A sample taken from the baulk face from about 80 cm below the wall base at the south end of the test area (fig. 13) yielded bits of lapis lazuli debitage and flint drills. This deposit lies immediately beneath the Phase C remains dated to 3300 B.C. or later. On South Hill lapis debris dated to 3370-3050 B.C. (P-2773) thus indicating that lapis working was already taking place at Hesār well before the end of the fourth millennium B.C.

The pottery in the deposit is mainly painted, with rare sherds of fine burnished grey ware and coarse cooking ware. The lowest part of the southward sloping deposit reached contained carbon which gave a date of 3685-3525 B.C. (P-2619). This lower part of the deposit contained sherds painted with designs assigned by Schmidt to his period «IIA» (1937: Pl. XX). In the southwest corner of the square which was deeply exposed by Schmidt's excavation, at a point still deeper but in the same stratified series of trash layers of Phase D another carbon sample gave a date of 4120-3875 B.C. (P-2623).

The excavated test was divided arbitrarily into three excavation lots separated by soil color changes as follows: lot # 1: 232 sherds from 1.3 to 1.7 m below the Phase C wall; lot # 2: 118 sherds from 1.7 to 1.9 below the Phase C wall; and lot # 3: 565 sherds from 1.9 to 2.25 m below the Phase C wall. In lot # 1 (fig. 35) the ratio of buff-to-red ware was 1:1. The burnished grey sherds totalled 11 of 232. Twenty-nine plain coarse grit-tempered cooking ware sherds occurred. Black-painted / red ware patterns included lozenge motifs while black-painted/buff ware patterns included dots, chains, and zigzags. In lot # 2 (fig. 35) the ratio of buff-to-red ware was 2:1. There were four thin, burnished grey ware sherds out of 118, and four coarse

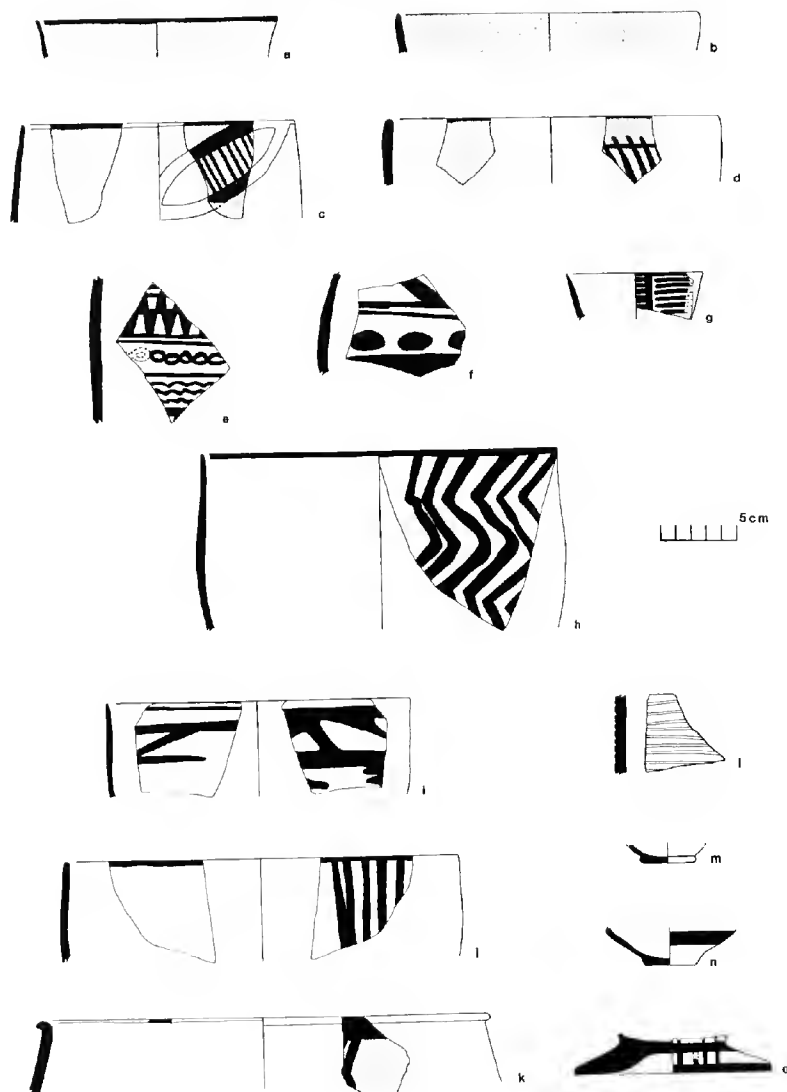


Fig. 35: North Eilat, 1976: Pottery from the Deep Test, CF 57 Lot #1 and Lot #2 (i, j, m, n, o)

cooking ware sherds. One grey ware sherd had incised parallel grooves. Animal and geometric patterns occurred on both red and buff painted ware. In lot # 3 (fig. 36) the buff-to-red ware ratio rose to 4:1. There were fourteen thin burnished grey sherds out of 565 others. Twenty-four sherds were of coarse grit-tempered cooking ware, and the only coarse straw-tempered sherd occurred. This latter sherd should represent the plain ware that one would expect with the earliest painted wares of the site but which has never been reported. It is the common plain ware associated with the painted wares at nearby Sang-e Çakmaq (personal

observation) which should precede the Hesār sequence as presently known. This lone sherd may indicate the presence of earlier unexcavated levels within Hesār. In lot # 3 are typical leopard and long-necked animal forms of the kind assigned by Schmidt to his «IIA» and «IC» periods. These motifs are also used in attempting correlations between Hesār and Siyalk III in the west, and Hesār and Turkmenian sites in the east. Their dating to 3600 B.C. is thus of interest to wider chronological problems. Also in this lot are jars painted with thick, sloppy, black wavy lines. Most significant of all in terms of technological development

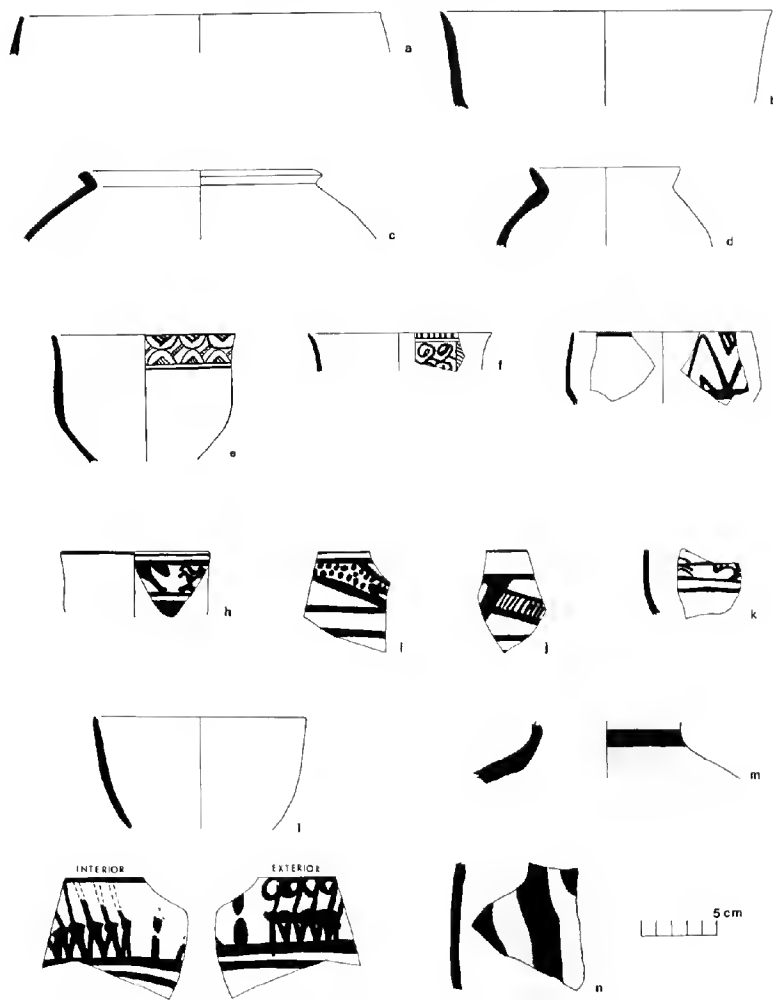


Fig. 36: North Flat, 1976: Pottery from the Deep Test, CF 57 Lot 43

at this early time is the presence of two of the thin, burnished grey ware rims of finest quality which represent typical period «II» beakers.

From this small but well-stratified sample one may suggest that the classic Hesār grey ware was already in existence by the middle of the fourth millennium B.C. at least in small quantity at Hesār. Perhaps it was imported? In any event, there is a demonstrable period of several centuries of overlap with the painted pottery before the grey ware began to be manufactured locally in large quantities. Analysis of the sherds reached in the deepest test area of the Main Mound in 1976 (dated to 4345-3515 B.C., P-2622) will shed further light on this situation. The appearance of the technique of buttressed wall building, and the introduction of masonry using mouldmade mudbrick combined with this shift in pottery production is undoubtedly signifi-

cant as a measure of cultural change and its interpretation will require further study.

North Flat: General Summary

The restudy of the North Flat has completed the description of the Burned Building with the addition of considerable detail as to its masonry system, order of construction, and major features. This information augments Schmidt's more general recording of the same structure and clarifies its plan. The results show that the building was in use over a considerable period of time during which numerous alterations were made before it was burned down. The high quality of its masonry work, the unusual and rich artifacts which it contained, and the presence of a specialized platform hearth in the main room lead to the hypothesis that it may have been a household with a religious function.

The possibility that the area of the building itself had a long-standing religious nature is raised by the presence of the earlier rooms filled with pottery and miniature objects including a figurine, and by the later occurrence of the calcite/alabaster objects over the same general area.

Stratigraphic sections for the North Flat allow the reassignment of various walls and masonry types to a controlled sequence tied to radiocarbon dates. This reassignment shows that the uppermost level covered the whole area at the end of the third millennium (Phase A, Schmidt's «IIC»); that The Burned Building and, in its late stage, the enclosure walls extending to the west, was built into the slope of a pre-existing mound. This construction, Phase B, appears to date to the third quarter of the third millennium, B.C. (Schmidt's «IIB»).

Directly underlying the Phase A remains east and south of the Burned Building, and under the Building itself and its western enclosure walls, is the complex older mound of Phase C (Schmidt's «IIB») remains which date to the end of the fourth millennium B.C. It is to this phase that most of the varied masonry walls exposed by Schmidt belong and not, as he suggests, to later periods. The two burned rooms excavated at the top of this sequence provide a unique collection of associated artifacts from an occupational context for comparison with the grave groups. Below the Phase C Mound lies a deep deposit of trash and ash, Phase D, containing lapis lazuli debris and a mixture of painted buff and red ware with some classic burnished grey ware. The assemblage documents the association of a number of motifs including the animal patterns assigned by Schmidt to his periods «IIA» and «IC». The material indicates that the techniques of making the grey ware was already in existence, although it apparently only became common in Phase C (when the buttressed masonry style also appeared). The radiocarbon evidence suggests that Phase D reaches back to the second quarter of the fourth millennium B.C., somewhat earlier for the occurrence of the grey ware and other pottery types than was expected.

Conclusion

Schmidt's (1937) temporal correlations for his major pottery groups holds up reasonably well. He placed the beginnings of period «I» probably in the late fifth millennium B.C., and the end of that period around 3500 B.C. His period «II» he equated to the Proto-Elamite-Jemdet Nasr epoch (c. 3500-2850 B.C.). His «IIB» period he compared to Early Dynastic Sumer, especially to the Royal Tombs at Ur (c. 2500-2400 B.C.), and he placed the end of «IIC» in the first half of the second millennium B.C.

Our currently available radiocarbon dates allow us to modify this suggested chronology slightly. The earliest dates in the deep tests on the Main Mound and the North Flat indicate that the painted pottery period must, indeed, go back into the fifth millennium B.C. as he suggested. His terminal date for period «IC» is probably a little too late and, perhaps, should be moved back a century to around 3600 B.C. (P-2619). His «IIA» period he correlates to the «Proto-

Elamite» period (by which he means Sialk IV and not «proto-elamite» as generally used today). Period «IIA» would seem to fall somewhere between 3600 and 3380 B.C. This period is followed by «IIB» which he equated to the Jemdet Nasr. The dates of 3380-2880 B.C. would now suggest an equation of «IIB» with Late Uruk and Jemdet Nasr, and the current «Proto-Elamite». The «IIB» period was left rather unspecified, although Schmidt compared it in general terms to the Early Dynastic III period (c. 2600-2400 B.C.). Dyson (1965: 241) pointed out that many items could be paralleled as late as the beginnings of the Ur III period and argued for a somewhat later date. The newly available date of 2420-2290 B.C. (P-2701) for the beginnings of the late stage of occupation of the Burned Building, and 2640-2390 B.C. (P-2618) on the Main Mound for period III remains, indicates that a general range from the second quarter through the third quarter of the millennium is probably correct. An open question remaining in the chronology is the date to be used for the beginning of period «III» (see below). Since there seems to have been a gradual transition from «II» to «III» this is a difficult question to resolve and will probably have to await more information from the stratigraphic sherd analysis being done by Susan Howard.

The terminal date suggested for «IIC» still seems the best one. The highest point on the Main Mound produced a date of 2150-1885 B.C. (P-2620); and «IIC» type graves were being dug from that level into the mound below. On Treasure Hill a carbon date of 1940-1705 B.C. was obtained for a layer of ash beneath a wall which formed part of the second building stage from the top. Assuming 50 years for each stage the terminal date would have had to have been at least a century later.

Schmidt's original model of the cultural change at the site suggested an infiltration of population in period «IIA» from the Gurgān plain just north of the mountains, and an attack and sacking of the site at the end of «IIB» with new settlers in «IIC». The infiltration, he believed, was evidenced by the decline but persistence of the painted pottery in the face of the rapid increase of grey ware, and by the sharing of forms between them during a period of overlap in «IIA». If our estimate of time is correct for «IIA» this process took place over about three centuries. During this period Schmidt saw the increasing variation in burial posture as further evidence of a change in cultural norms. To these changes we may now add at the beginnings of «IIB» the appearance of mould-made bricks in quantity and a well-established masonry tradition which included buttressed facades. It seems entirely possible however, that these are cultural changes brought about through contacts involved in the growing east-west trade on the plateau – an event that was repeated on a number of occasions in the historic period. The route of the east-west contacts is already well marked in the sixth millennium B.C. by the distribution of a very specific kind of painted pottery known as Česmeh Ali ware. The pottery has now been found from Sang-e Čakmaq near Shahrud to the east of Hesār to Sialk near far to the west

(Shahmirzadi, 1977). Although not yet evidenced at Hesār itself (virgin soil has not been reached at the deepest point under the Main Mound), sherds of this pottery are present at Shahr-e Qumis where they erode out of Parthian brickwork indicating the presence of prehistoric remains somewhere under the site. The distribution of this pottery follows the agricultural zone between the Alborz and the central desert from Kazvin to Tehran to Dāmghān – the main historic route of travel. It is interesting to note that this Češmeh Ali pottery was carried already in the sixth millennium over the Alborz and down the Caspian shore where it occurs as an import at Hotu Cave near Beshahr at the western end of the Gurgān plain (University Museum Collection). Contact between the Gurgān area and the plateau is thus well documented long before the development of the grey pottery in the fourth millennium B.C.

At Hesār itself a major remaining problem is the clarification of the transitions between the major periods. Because of the lack of stratigraphic control and the absence of quantitative data on ceramic assemblages the nature of transitions in «IIA» and «IIIA» are very confused – both in the typology used to define them, and in the application of that typology to occupation levels in the site.

The work in 1976 was largely focussed, as it turned out, on problems of the transition from «II» to «III». In this respect the problem becomes very clear in that on the one hand there is the cluster of graves with the type indicators for each period: long-stemmed and short-stemmed bowls for «II» and bottle-jars, spouted jars and canteens for «IIIB & C». The relative chronology suggested for these two groups is second half of the fourth millennium on the one hand and second half of the third millennium on the other. This general correlation appears to be reasonably supported by typological comparisons of non-ceramic artifacts. In contrast to this structure there is now, as the result of our 1976 work, an independent set of radiocarbon dates which in broad terms supports this estimated chronology. However, for these excavated materials which came from controlled contexts we can now see that while a *C14* date makes a level belong to period «II» the ceramic types include items which have been

called «IIIA» or even «IIIB». It is certain therefore, that these particular types had a much longer duration than formerly attributed to them and had already appeared at a date which place them in period «II» rather than «III». For example, although bottle-jars appear in CF 58 /2/ and /3/ and have been said to be characteristic of «IIIB» (2600 B.C. or later) they are already present in a context dated to 3100-2900 B.C. Furthermore, that context is stratigraphically earlier than the Burned Building which is called «IIIB». In addition the associate forms are classic stemmed vessels of «IIIB» type (even including a long-stemmed form said to occur only in «IIA»). One can only conclude, therefore, that we are dealing here with a phase of Hesār «II» in which bottle-jar have already appeared. This situation would suggest that we should perhaps accept the disappearance of the stemmed bowls as the criterion for introducing the period «III» terminology. If we do this, then period «IIIA» disappears (and all of the confusion assigning habitation levels to it), and the real cultural shift occurs between «II» and «IIIB» sometime toward the middle of the third millennium. This change in interpretation fits both the Main Mound evidence as reconstituted as well as that revised for South Hill. In the latter instance Schmidt finally called Building 4 «IIIA» although discussing it under «II». The date places it in «II» as does the related material from Tosi's study on the South Hill. In the Main Mound the building remains dated by radiocarbon are much too early to be «IIIB» as published. They must be put back into «II». Since they are full of stemmed vessels the revised definition proposed fits perfectly well. This revision results in the loss of any substantive architectural information in period «III» except for the Burned Building and, in view of the presence in the building of such things as beaked spouts (said to be characteristic of «IIIC»), raises the question of the true relationship of the «IIIB» and «IIIC» assemblages. If one removes the alabaster/calcite objects there would seem to be a closer relationship between «IIIB» and «IIIC» than between «II» and «III». Certainly the reduction in the size of the settlement combined with an extraordinary increase in the wealth represented by burial goods is a cultural phenomenon well worth further study.

VIII. THE EVIDENCE FOR CRAFT SPECIALIZATION IN THE PRODUCTION OF CHIPPED STONE BLADES AT TAPPEH HESĀR

Michael Rosenberg

The importance of the Hesār chipped stone artifact assemblage in elucidating that site's role in the late prehistoric trade networks of Southwest Asia has already been recognized (e.g. Tosi & Piperno, 1973; Bulgarelli, 1974; etc.). In particular, the recovery of chipped stone drills and other artifacts associated with the processing of lapis lazuli have contributed to an understanding of Hesār's role in the trade in that commodity and its products. Moreover, these chipped stone artifacts have been particularly important in the reconstruction of manufacturing stages in the processing of lapis and their distribution over the site would seem to imply that the processing of lapis was a specialized craft (cf. Bulgarelli 1974, 1979). In addition, it has been suggested by Pigott, *et al.* (1982) that specialization in metallurgic and ceramic crafts is also evident at Hesār. It is, therefore, noteworthy that the chipped stone blade assemblage suggests that such blades were frequently the product of craft specialists. That is, the assemblage suggests that chipped stone blade production was yet another specialized craft practiced at that site.

The sample available consists of only 99 pieces of chipped stone. These are approximately evenly divided as being the products of the 1931-32 and 1976 excavations. The several thousand piece balance of the lithic assemblage, primarily the product of the 1976 excavation and consisting primarily of those chipped stone artifacts such as micro-drills and other types associated with the processing of lapis lazuli, is either in Tehran or under study elsewhere and was consequently unavailable for examination.¹ Of the total sample at hand, 37 were shaped (i.e., extensively chipped) projectile points and other pieces of similar limited value in analyzing the production techniques employed to produce the blanks on which they were made. The breakdown of the remaining pieces is as follows. The term «diagnostic» refers to pieces sufficiently intact as to allow inspection of the butt and bulb of percussion. That is, it refers to pieces sufficiently intact as to convey information about the production process(es) of which they are products.

Cores - 2
Diagnostic blades - 18
Non-diagnostic blades - 25
Diagnostic flakes - 4
Non-diagnostic flakes - 5
Diagnostic microblades - 1
Non-diagnostic microblades - 1
Angular pieces - 4
Miscellaneous artifacts - 2

Of the 18 diagnostic blades, 8 were recovered during the 1976 excavation of the main mound conducted under the direction of Dr. R.H. Dyson, Jr. and Dr. Maurizio Tosi. The balance of the blade sample was unearthed by E. Schmidt during 1931-32. Table 1 lists these eighteen blades and their salient attributes.

The attributes examined were selected for the information they are believed to convey about core geometry and production technology. In addition to spacial context and dimensions (cols. 1,2,3), the following attributes were examined for the reasons given. Bulbar scar (eraillure) +/- (col. 4), debatably reflective of a hard hammer direct percussion mode of production (cf. Crabtree 1972 - pro; Faulkner, 1972 and Speth, 1972 - con); flaking angle as measured at point of applied force (col. 5), related to platform angle; lateral slope of the striking platform (col. 6), reflecting the obliqueness of the striking platform to the longitudinal axis of the blade (and by implication the core from which it was detached); platform faceting +/- and if + total number of major facets (col. 7) as well as the number of facets originating on the periphery of striking platform (col. 8), the faceting reflecting methods of striking platform preparation (for the dimensions and directions of facet flake scars see figs. 1-3); relation of facet scars to point of force application (figs. 1-3); reflecting function, if any, of facets, such as raising the desired point of force application, etc.; ridging scars (col. 9), reflecting core preparation methods.

The most striking feature of the blade sample is the fact that all the blades on which the proximal end could be observed, i.e., the diagnostic pieces, are apparently the product of a similar production process. For that reason it was decided a study would be worthwhile despite the small sample size. Specifically, the striking platforms of the blades are uniformly large, frequently approaching the sectional dimensions of the blade, and the striking platforms are often trapezoidal or triangular in configuration (figs. 1-3). The bulb of percussion is usually quite pronounced and a large bulbar scar (eraillure) is also usually present. The striking platform overhang, resulting from previous

¹ Study of the sketch drawings made of those pieces relevant to this paper but left in Tehran indicates that they apparently do not differ appreciably from the sample at hand and consequently do not contradict the conclusions based on the sample at hand.

Table 1: Attributes of Blades from Tappeh Hesār

	Spacial Context	Function	Length	Width	Thickness	Bulbar Scar	Flaking Angle	Striking Platform Slope	# of Major Facets	Originating	Ridging
H198 33-15-368	DF18	util. blade	7.1	2.0	0.5	+	70°	10° rt.	3	0	-
H331 33-15-71	CG95	sickle blade	6.4	1.7	0.7	-	90°	20° rt.	2	0	+
H1592 33-15-369	EG06 near grave 8	unutil. blade	6.4	2.1	0.6	+	80°	5° lt.	1	-	-
H835 33-15-73	DH21	util. blade	6.7	2.2	0.5	+	80°	15° rt.	1	-	-
H840 33-15-72	DG36	util. blade	5.8	1.9	0.6	+	80°	20° rt.	2	1	-
H847 33-15-370	DH73	util. blade	8.5	1.3	0.5	+	90°	10° rt.	2	1	-
H967 33-15-371	DH73 refuse	util. blade	9.7	2.2	0.6	-	85°	10° lt.	2	1	+
H1091 33-15-372	EH13 refuse	sickle blade	7.9	1.6	0.6	-	80°	20° lt.	1	-	+
H1242 33-15-74	DG69 grave 14	util. blade	6.8	1.5	0.6	+	80°	15° lt.	1	-	-
H1695 33-15-608	DF78	util. blade	9.8	1.8	0.7	-	85°	5° rt.	2	1	-
H76 N31a	CG90 « kitchen »	util. blade	4.5	1.8	0.5	-	80°	20° lt.	4	1	-
H76 N63a	CG90 outdoor trash	util. blade	5.4	2.2	0.5	+	90°	5° lt.	3	0	-
H76 N63b	CG90 outdoor trash	util. blade	6.6	2.2	0.5	+	80°	0° lt.	2	0	-
H76 N64a	CG90 outdoor trash	util. blade	5.0	2.2	0.5	+	80°	20° rt.	3	0	-
H76 N64b	CG90 outdoor trash	util. blade	4.2	1.7	0.6	+	80°	15° lt.	2	1	-
H76 N82	CG90 outdoor trash	util. blade	4.8	1.8	0.6	+	80°	15° lt.	1	-	+
H76 N83a	CG90 outdoor trash	util. blade	4.7	2.1	0.5	+	80°	0° lt.	2	1	-
H76 N116	DF90	util. blade	3.2	1.7	0.4	+	80°	25° lt.	2	0	-

detachments, is often quite pronounced and was vertically trimmed off on only 2 of the blades at hand. While not common to the blade assemblage as a whole, 4 of the blades (as well as one non diagnostic blade fragment) exhibit traces of ridging scars in place of or superimposed on one or more of the lateral dorsal scars (see figs. 1, 6; 2, 14, and 16 and 17).

However, the combination of attributes which provide the primary justification for the usage later in this paper of the appellation « atypical » in reference to Hesār blades are those which reflect the nature of the core from which they were detached. The flaking angle, i.e., the angle between the striking platform and the ventral (i.e., bulbar) surface of a blade, is predominately acute in the sample at hand, ranging from 70 to a maximum of only 90 degrees ($X = 81.7$) at the point where force was applied to detach the blade.

This consistently acute flaking angle and its dorsal counterpart, a consistently obtuse platform angle, suggest that the striking platform of the core from which these blades were detached was at an obtuse angle to the working face of the core at all times. It should be noted that this obtuse platform angle is a marked deviation from the typical type blade core on which this angle is usually varying degrees of acute (Speth, 1972:54). Moreover, this is in distinct contrast to the pattern exhibited by the 4 diagnostic flakes in the sample on which the flaking angle is uniformly obtuse and the platform angle is uniformly acute, i.e., also typical.

Also noteworthy is the fact that 13 of the blade striking platforms exhibit an irregular faceting with the individual facets being generally large enough to allow the assumption that they are primarily the product of some mode of percussion as opposed to pressure. When present, this faceting sometimes give the butt of the blade on which it is found an irregular lateral curvature of varying degree (e.g. fig. 1, 1, 4, and 9).

The final noteworthy attribute of the Hesār blades is the obliqueness of the striking platform to the longitudinal axis of the blade. As can be seen in Table 1,

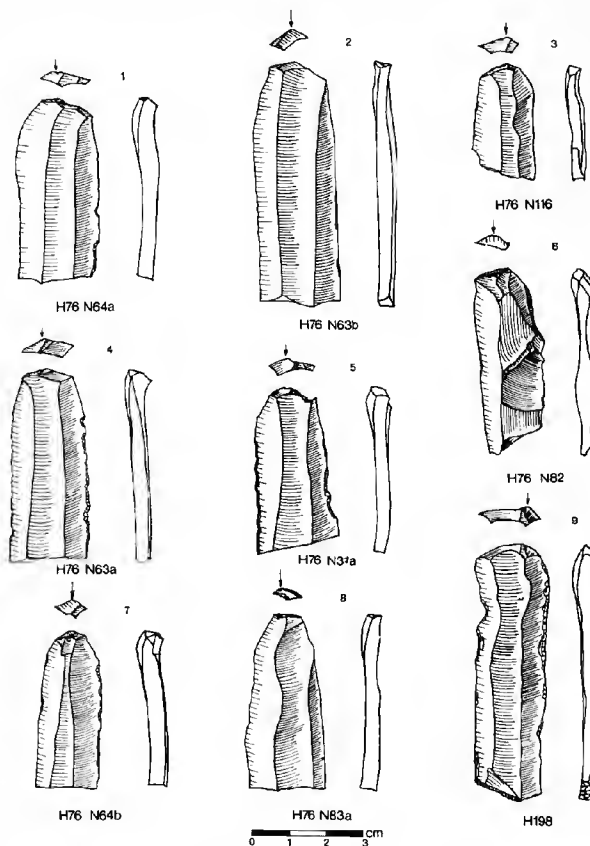


Fig. 1: Tappeh Hesār: Chipped Stone Blades

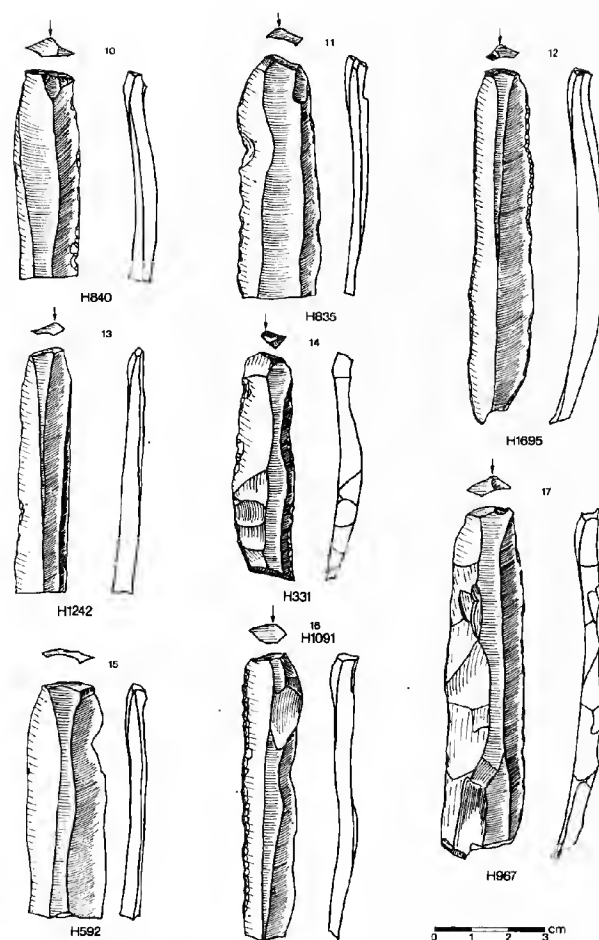


Fig. 2: Tappeh Hesār: Chipped Stone Blades

only 2 of the blades have a striking platform which can be considered horizontal and in the case of 1 of these the blow which resulted in the detachment of the blade fell on a facet which was more oblique than the overall striking platform.

In addition to the blades, two cores were available for inspection. While they are too far reduced to be of much use in delineating the production process itself, they do support the certain inferences drawn from the blades as to the type of core used for the production of the Hesār blades. That is, the cores are cylindrical, having been worked on all sides, are occasionally worked from both ends (see fig. 3, 20), and exhibit an oblique striking platform (see fig. 3, 20 and 21). Such a cylindrical core having an oblique striking platform is in keeping with the variable degree and direction of striking platform slope exhibited by the blades in the sample. Moreover, what little remains of the striking platforms gives no indication that the striking platforms were flat. Rather, despite some battering they would appear to be irregularly convex

and this is in keeping with the consistently acute flaking angle of the blades.

The mode by which the Hesār blades were detached was almost certainly hard hammer direct percussion (compare Bordes & Crabtree, 1969: fig. 7a and Newcomer, 1975: fig. 3 with figs. 1 - 18). Given the demonstrated relationship between striking platform thickness, flake size, and force required to detach a flake (cf. Speth, 1974:15), the thickness of the striking platforms of these blades indicates that the force required to detach these blades was sufficient to arguably rule out pressure. Similarly, it arguably rules out soft hammer direct percussion. Moreover, the general presence of striking platform overhangs is probably indicative of hard hammer direct percussion, because, as Newcomer (1975:100) points out, with a suitable hard hammer, force can be successfully applied well back from the core platform edge easily bypassing the overhang. That is, it can be presumed that hard hammer direct percussion does not consistently require platform overhang trimming – as do other modes –

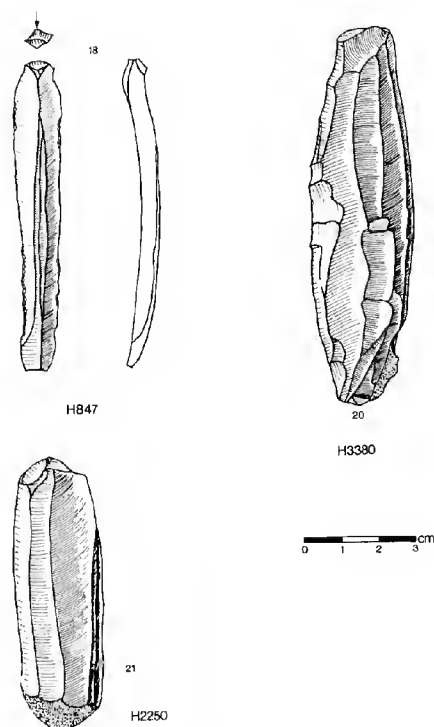


Fig. 3: Tappeh Hesār: Chipped Stone Blade and Blade Cores

because the greater force capable of being generated by hard hammer direct percussion is sufficient to allow detachment of the thicker blades which of necessity result when force is applied far enough back from the core edge to be well clear of the overhang.

One can also argue against the use of indirect percussion for the production of the Hesār blades as the obtuse platform angle would arguably make it difficult to properly seat a punch. Moreover, the difficulty in seating a punch created by the obtuse platform angle can only be compounded by the overall obliqueness of the striking platform. It is, however, conceivable that a variation of the upper paleolithic punch blade technique utilized at Corbiac and other contemporary sites (cf. Bordes & Crabtree, 1969) might have achieved a result similar to the Hesār blades if as at Corbiac the faceting served to provide a seat for the punch. However, judging from the lack of a consistent pattern to the faceting, such would not appear to have been the purpose of the faceting present on the Hesār blade butts. Moreover, in those instances where one of the facets originated at the outer edge of the blade's striking platform, producing in the process a concavity in the form of a negative bulb of percussion, which could have been used to seat a punch, the concavity was not the point at which force was applied to the core; the force having been applied at the distal and flatter end of the facet scar or on an adjacent considerably flatter facet.

Nor would it appear that the faceting was an operation designed to improve the accuracy with which blades could be detached by percussion (i.e., by raising the desired point of impact, etc.) as the blows which resulted in the detachment of the blades in the sample at hand in no case fell on the high point formed by the juncture of any two of these scars. It would probably be more accurate, therefore, to consider the entire faceting process as a general striking platform creation technique, used to shape the core but not usually used to improve the accuracy with which individual blades were detached. In support of this interpretation, it is worth noting that only 7 of the blades with faceted butts have one or more of the facets originating at the outer edge of the butt as would be expected if the faceting served to modify the striking platform prior to the detachment of individual blades.

While the consistent use of the hard hammer mode for the production of the blades at Hesār is interesting, it would not in itself be overly meaningful were it not for the fact that the method used to produce the blades is apparently highly atypical of what is generally considered the norm for the time and place under discussion and arguably more difficult than methods utilizing cores with different configurations. As noted, the flaking angle and lateral slope of the striking platforms on the blades in the sample, as well as the 2 available cores, suggest that we are dealing with a cylindrical core having an oblique irregular convex

(i.e., domed) striking platform. It was further noted that such a combination of attributes is a departure from the norm and if Speth's (n.d.) observations as to the greater degree of accuracy required to remove a flake at increased platform angles are applicable to obtuse platform angles as well as the variably acute angles he experimented with,² then the Hesār blades must be considered the work of skilled individuals.

The limited available data made a detailed reconstruction of the production technique employed for the manufacture of the HesaHesār blades too speculative an endeavor at this time. Some limited observations are nevertheless possible at this time. As noted earlier, 4 of the blades exhibit what are probably ridging scars. In 2 of the blades (fig. 2, 14 and 16), however, these lateral scars are not contiguous and would appear to be more the result of secondary preparation of the core face rather than the ridging done to prepare the core for the detachment of the first blade in the series. As is best illustrated in the blade reproduced in figure 1 (H76 N64a), the technique employed frequently relied more on the core's vertical scar ridges – a product of previous detachments – to determine the configuration of the blade and the direction of detachment than it relied on the direction of the applied force. That is, both the blade itself and its three dorsal scars reflecting previous detachments appear to illustrate the vertical channeling of an obliquely applied force. Thus, the secondary ridging, if in fact that is what these irregular lateral scars on blades H1091 (fig. 2) and H76 N82 (fig. 1) represent, functioned to remove irregularities in the configuration of the core which might distort the form of the finished product, i.e., the blades, such irregularities being trimmed off laterally as they occur.

Such lateral trimming may also have been used in place of vertical trimming to remove the striking platform overhangs when on rare occasions this was a necessary step. As is visible in the illustrations (e.g. fig. 3, 18), a few of the blades have lateral flake scars at the outer edge of the striking platform which bevel the platform angle. These scars do in fact decrease the size of the overhang and may very well have been the product of just such a trimming process.

To summarize, it would appear that all the blades in the sample at hand were produced by hard hammer direct percussion and the cores from which they were detached have as their most distinguishing characteristics a single or opposing set of oblique convex crudely faceted striking platforms. Moreover, given the less than ideal configuration of the core it is likely that a high degree of skill was required to manufacture these blades in the consistently well made manner in which they are found.³

The current consensus views the introduction of soft hammer direct percussion and indirect percussion modes, as well as certain pressure flaking techniques, to constitute progress in blade production technology. The inherent advantages of these modes is attested to by the fact that these modes replace the more difficult to control hard hammer mode to the point where examples of blades produced by the latter mode for most uses become increasingly rare in the later prehistoric and early historic periods. It should be

noted, however, that when efficiency is a factor, gains in the quality of blades produced in these various ways are offset by the greater degree of attention to core preparation and placement of flaking blows required by these techniques. The rapidity with which a large number of blades can be produced by a relatively small number of skilled individuals utilizing task specific tools and hard hammer production techniques has already been documented (Clark, 1935:53, Bordaz, 1969:77). Moreover, blades produced by hard hammer direct percussion techniques employed by skilled individuals suffer only marginally in most respects when compared in terms of quality to blades produced by other modes. Thus, in situations where rate of output takes precedence over product quality but where a degree of product quality and uniformity is nevertheless desired, hard hammer direct percussion would logically be the mode of choice for the production of blades. Moreover, it is in just such restricted situations, wherein a high rate of production and a reasonably standardized product are simultaneously desired, that hard hammer direct percussion is documented as being the chosen production mode. Hence, the predominance of blades produced by this mode, i.e., hard hammer direct percussion, at Hesār suggests that here we have another of those situations wherein rate of output was a major consideration.

It is unfortunate that for most contemporary sites detailed analyses of the chipped stone assemblages have not been published and many of those that do pertain only to particular segments of the assemblage. This unavailability of comparative data makes inferences drawn from the characteristics of the Hesār blade sample more difficult to substantiate than they would otherwise be.

It has been inferred that all the analyzable Hesār blades were produced by hard hammer direct percussion and that the method employed required a degree of skill. Moreover, it has been noted that the production mode employed was suited to the mass production of reasonably well made blades as opposed to more limited production of very fine blades. Two situations can be offered to account for the presence of such blades at the site.

- 1) The Hesār blade production technique was employed by all able bodied individuals at the site whenever the quantity/quality trade-off made the technique's use preferable. That is, the technique was common knowledge and used by a large number of individuals to produce chipped stone blades.
- 2) The Hesār blade production technique was employed by a small minority of the site's population who specialized in the production of chipped stone blades and by their activities produced sufficient quantities to in large part satisfy the needs of the site as a whole.

² Speth's observations are based on experiments conducted on prisms having platform angles of 90 degrees or less. It is assumed that his conclusions can be extrapolated to cores with platform angles of more than 90 degrees but this remains to be verified.

In order to address the problem of whether or not the Hesār blades are the product of specialized flint knappers, a comparative yardstick of intrasite technological variability would be extremely useful. In the absence of comparative literature, however, it becomes necessary to refer to the chipped stone assemblage recovered in the excavations at Malyan. This assemblage is currently in the initial stages of analysis by the author and for that reason detailed data are as yet still unavailable. Several general points can nevertheless be made about the Malyan assemblage at this time. Taking the site and all its bronze age occupations as a whole, the range of production modes and methods used to manufacture chipped stone is apparently very wide. That is, the assemblage exhibits a high degree of technological variability when viewed in its entirety. A wide range of variability is still apparent in the individual spacial and temporal excavated subdivisions of the site even though there is occasional segregation of the variants by subdivision. The most conspicuous example of such segregated variability is the occurrence of a hard hammer direct percussion flake production work area in the courtyard of the second phase of the large Middle Elamite building exposed in operation EED. In keeping with the noted efficiency of this mode it is worth pointing out that over 170 kgs. of chipped stone broken up by hard hammer percussion were removed from this area (Carter & Stolper 1976:37).³ The same area also contained a large quantity of calcite crystals and the presence of the two materials may be related to some as yet undetermined production activity. For most of the other areas, however, variability rather than uniformity would appear to be the rule. Blades vary considerably in size, degree of fineness, and in accordance with the expectations that in the absence of overriding considerations the technology which yields the highest quality products will be employed, the Malyan blades would appear to be the product of modes other than hard hammer percussion. Moreover, most would appear to be the product of well known common production methods and do not exhibit the type of atypical flaking angles found on the Hesār blades. It is the opinion of the author that this variability in the blades and blade production modes may be the product of the blades having been made by numerous individuals to fill their own needs. This is not to rule out the possibility that blades at Malyan may have been made by specialized knappers, it is simply that in the absence of confirmed workshops related to blade production it is safer to attribute variability in the blades to variability in individual skills. It is with regard to this point that it should be noted that in the rare cases where two or more blades can be demonstrated to be the product of the same core, they were found in close association within the confine of a single non-public structure.

With regard to the Hesār blades, therefore, it can be argued that the lack of variability in the Hesār blades suggest that they were the work of a limited number of individuals and not a large number of individual householders for if the latter was the case a wider range of technological and morphological variability reflecting individual skills could justifiably

be expected despite the small sample size. Moreover, the atypical and arguably difficult production method employed coupled with the noted lack of variability implies that these were a highly skilled group of individuals. And finally, the bias toward quantity over fine quality inherent in the production mode employed, i.e., hard hammer direct percussion, suggests that rate of output was a factor.

If the high rate of production implied by the production mode was based on the knappers' own needs nothing more can be said beyond the statement that some of Hesār's inhabitants were very skilled prolific flint knappers who in the course of meeting their own needs for large quantities of flint blades, swamped the small sample at hand with their products. If on the other hand flint blade production by these individuals was geared to producing more than their own needs, these knappers could justifiably be referred to as specialists.

This implies a narrow definition of specialist, a specialist being someone who produces a surplus of a product and makes it available to others. Excluded is what we can refer to as a division of labor specialist, analogous to a modern assembly line worker, who specialized in the performance of a task within the confines of some larger production process. This exclusion is based on the rationale that it is probably already present within most crafts such as ceramic manufacture, lapis processing, etc., which we call specialized and on the presupposition that products of division of labor type specialization are not as readily discernable as the products of specialists from those of non-specialists. That is, the products of individuals chipping stone as part of larger production processes would exhibit many of the characteristics of products turned out by non-specialists since each manufacturing center would have its own knapper and these individuals' products, as well as the production byproducts, would be found conforming to the same distributional pattern as the products of other households as well as exhibiting something approaching the variability which characterizes the products of a large number of individuals.

The question of whether or not the Hesār blades were the product of craft specialists thus boils down to the question of whether or not they were manufactured for use by others. Two lines of evidence can be brought to bear on this question and they suggest that these blades were manufactured for use by others. They are the spacial distribution of the blades at Hesār and the function these blades were made to perform.

The most important specialized craft practiced at Hesār was almost certainly the processing of lapis lazuli. As noted by Bulgarelli (1974:27; 1979:42), lapis lazuli work areas are widely spread over the whole site. As also noted by Bulgarelli (1979:51) the production of chipped stone artifacts used for the processing

³ Carter and Stolper believe the material to have been brought into the building from elsewhere already broken up. The author, having examined a sample of the material which included cores, disappres and believes that the flakes were probably produced within the building.

of lapis took place in the individual workshops. Thus, chipped stone associated with the processing of lapis would come under the heading of division of labor within a craft specialty rather than craft specialization.

The quantities of chipped stone required for the processing of lapis were quite large and chipped stone artifacts and chippage associated with this industry are the major component of the Hesār lithic assemblage (cf. Bulgarelli, 1974; 1979). Given this obvious outlet for large quantities of chipped stone and the quantitative orientation of the Hesār blade production methods one could justifiably expect the Hesār blade to occur in association with lapis processing. Such, however, would appear not to be the case. In contrast to the large size of the Hesār blades, the chipped stone artifacts associated with lapis processing are distinctly microlithic, i.e., small in size. Moreover, in contrast to other sites at which lapis was processed, morphological uniformity in the chipped stone tools used was not required or even desired. « Thus, at Tepe Hisar the very regular flint *microblades* used... at Šar-e Sūxteh are replaced by shapeless, often non retouched flakes... » (Bulgarelli, 1974:26 *my italics*). A similar emphasis on function as opposed to morphology characterizes the micro-drills. Thus, given the available information, the production of Hesār blades was not directly associated with lapis processing.

Given the small sample of blades at hand, the actual context in which they were found, is not as helpful as it might otherwise be if a larger sample were available. The blades recovered from the 1976 excavation of the main mound come primarily from an outdoor trash deposit with 1 blade, 1 flake and 4 pieces of angular « shatter » coming from a previously cleaned-out domestic structure. All that can be said with any degree of certainty is that the general ratio of chippage to blades as well as absence of cores suggests that this was not a flint working area either. Contexts for the blades and cores unearthed by Schmidt are less detailed. Spatially, they would appear to occur over most of the mound (see Table 1, for grid locations) and in context varying from refuse to burials. In general, therefore, we can say the Hesār blades have a wide spacial distribution and occur in a number of variable contexts none of which can be demonstrated to be in association with the site's primary industry, lapis production or any of its other known specialized crafts such as ceramic production.

With regard to the actual use to which the Hesār blades were put, of the 18 blades in the sample, 2 were sickles, 15 have varying degrees and types of unspecific use retouch, and 1 does not exhibit any significant degree of retouch at all. Thus, it would appear that the Hesār blades were put to variable uses none of which were apparently related to the specialized crafts known to have been practiced at the site. To the contrary, if their use as sickles is at all indicative, it would appear that they were used primarily in non-specialized activities such as agriculture and miscellaneous cutting, scraping, etc. Moreover, in view of the fact that all the available blades are apparently the products of a single basic production process it is probably reasonable to assume that at least some of

the fragmentary blades are also a product of that process. Thus, we can reasonably add to the above range of uses those to which the fragmentary blades were put and include « footed » or tanged (hafted?) blades (see Bulgarelli, 1974: fig. 2:13 for an example of a footed blade). Also, the fact that 16 of the 25 non-diagnostic blade fragments exhibit some degree of what is usually called « sickle sheen » arguably indicates that this was a more common use for the Hesār blades than is indicated by the sample of 18 technologically analyzable blades.

To summarize, both the context in which the blades were found and the variable, apparently non-craft-related, uses to which they were put suggest that a fairly wide range of activities was carried out using these blades. This inference in turn can be construed to imply a relatively large number of individuals using the blades. In contrast, the consistent use of a specific method to produce these blades and the ease with which the method lends itself toward mass production suggest that the blades were produced by a smaller number of individuals than used them. Thus, by definition this situation suggests craft specialization.

The small absolute and relative number of blades which constitute the sample and mass production orientation of the production method used to manufacture them raise the final point which requires confrontation. That is, if these blades were in fact the products of craft specialists using mass production methods then arguably one could expect blades to occur with greater frequency than they apparently do. The scarcity of blades in general is probably not an artifact of excavation procedures as Bulgarelli (1974:18) comments on the relative scarcity of blades and cores, as compared to other types, in survey samples collected on the mound. Thus, while numerically small, and relatively even smaller due to the enormous size of the lapis production related lithic component, the sample of Hesār blades may, nevertheless, be reasonably representative of blade types which occur on the mound. Moreover, mass production techniques do not necessarily require greater numbers of an artifact type to be present, if as is being argued here there was mass production by specialists, rather than domestic production by individuals, of an artifact made for domestic usage. That is to say that in situations such as this, wherein demand can be assumed to be relatively constant — being a product of population size alone, craft specialization and mass production need not necessarily be reflected in higher frequencies of the artifact type. It is with regard to this point, i.e., the relative scarcity of blades at Hesār, that it is worth noting that blades constitute a very small portion of the Malyan lithic assemblage as well.

The Malyan material, however, leads into a second point which requires some clarification. At Malyan, chipping waste is a significant, if not the major, component of the lithic assemblage. At Hesār, however, excluding the lapis production areas, it is apparently not. While for the 1931-32 excavation the absence of chipping debris may be an artifact of recovery procedures, this is not the case with the 1976 excavation on the Main Mound where flakes as well as other

«waste» account for less than 33% of the chipped stone recovered. This figure indicates that these blades were made in areas other than those uncovered in the 1976 Main Mound excavation. Since craft specialization implies the existence of workshops, the surprising paucity of chipping debris relative to artifacts is entirely consistent with the type of craft specialization in chipped stone blade production proposed in this paper.

In conclusion, the evidence at hand suggests that at least some aspects of chipped stone blade production at Hesār may have been a specialized craft. Chipped stone flakes and blades, no doubt, continued to be

made by individuals for their own use but such seem to be absent in the sample at hand and, if the sample is representative, such would have appeared to have been a minority of the total blades produced and or utilized in the portion of the site excavated to date.

Given the acknowledged existence of other specialized industries at Hesār and the apparent use of an unusual and arguably esoteric technique for the production of chipped stone blades, the suggested presence of craft specialization for the production of a portion of the settlement's chipped stone blade needs is not implausible.

IX. NOTE ON A TEXTILE SAMPLE FROM THE
MAIN MOUND AT TAPPEH HESĀR, 1976

Richard Ellis

Two samples of putative textile fabrics were examined under moderate magnification ($\times 10$ $\times 70$). One turned out to be indeed a textile, the other was not.

Sample 1 (fig. 1): DG 01 Burial 6; fragment lying below the skull. Several fragments of coarse red-brown textile; none was larger than about 2 cm. long.

fiber: animal, presumably wool

yarns: system a) S-spun single, .5-.8 mm. diameter

system b) Z-spun single, .5-.8 mm. diameter

There is no way to tell which system was the warp and which the weft. weaver: tabby, 8-10 yarns per cm. for both systems.

The sample also involved a small light colored bit of what is probably felt. This fabric was rather loosely woven. Its only distinction is that its warp and weft were spun in different directions. This was presumably done for the sake of the visual effect; it results in the slanting lines of the twist running in the same direction in both systems.



Fig. 1: Sample 1



Fig. 2; Sample 2

Sample 2 (fig. 2): DF09 Lot 11/12 Burial 3, Sample no. 59

This sample consists of a mass of whitish fibers mixed with brownish-grey powder. The fibers are probably of vegetable origin, though no identification can be made without greater magnification than was available.

There are no traces of spinning or weaving. The only «structure» visible is that some fibers are stuck together in groups of from half a dozen to a dozen or more. The sample also includes some small fragments of light grey material rather like felt.

X. GROUND STONE TOOLS AND ARTIFACTS AT TAPPEH HESĀR, 1976

Lee Horne

Thirty-two stone tools and objects were recovered in the 1976 season at Tappeh Hesār. Those with numbers prefixed with «N» form part of the study collection at the University Museum in Philadelphia, except for N76-N3, N90, N99 and N110, which were discarded in the field. The rest are in the collection of the Iran Bastan Museum in Tehran. The author was able to examine only those in The University Museum; information for the rest of the objects was taken from registry cards written in the field. Rock identifications were made with the aid of a hand lens and dilute hydrochloric acid. No traces of pigment or other signs of the materials being worked were seen.

In spite of the size of the sample, a range of functional and stylistic types are represented, as well as a range of materials. The numbers are, nevertheless, too small to use this variation to make useful chronological or spatial distinctions, and what follows is a descriptive catalog which should be read in the light of the contexts and associated artifacts and features described elsewhere in this volume.

Grinding stones: H76-N1 (fig. 1a), N90 and H76-130

Most of the grinding stones are «saddle-shaped»; this is, longer than wide, convex bottomed, and concave along the long dimension of the grinding surface. H76-N1, the only specimen available for examination, is of medium grey, fine-grained igneous rock. Originally a water-worn cobble, its grinding surface has been shaped, sharpened, or resharpened by pecking, over which smooth areas have developed from use. It was found in the South Hill Industrial Area (assigned generally to Hesār II). H76-130, a complete grinding stone, was found on the floor of CF 58 room /2/ also of «period II» in the North Flat, along with three handstones (see below), none of which are wide enough to have been the type generally thought to be paired with saddle-shaped grinding stones. H76-N90 is another end fragment, like N1, and comes from the DF 09 Sounding, lot 3 (Hesār I?). Similar grinding stones from the earlier excavations are illustrated in Schmidt (1933: Pl. CXLII, H1113, Hesār III; 1937: Pl. LXIII, H 1702, Hesār III and probably 72a in fig. 53, CG 95, Burial 28, assigned to Hesār IB) as are two different types not found in the 1976 season (1933: Pl. CVI A, H1576, Hesār II; 1937: Pl. LXIII, H5207, Hesār IIIA).

Handstones: H76-N2 (fig. 1b), N108; H76-131 (fig. 1i), 132, 133, and 134.

Included in this category are all those handstones for which grinding was a primary function, though some have signs of other types of wear as well. All are from «Hesār II» contexts. H76-N2, from the South

Hill Industrial Area, is sandstone, of discoidal shape with one slanted facet slightly convex in both directions. H76-N108 is also circular in plan but is slightly planoconvex in section, of carbonate sandstone, and highly polished on all surfaces except one area on the perimeter which is damaged by battering. The stone is too soft to have been used for grinding or abrading, and may have been a polisher of some kind. H76-132, 133 and 134 were all found on the floor of North Flat CF 58 room /2/ where a complete grinding stone was also found (see above H76-130). H76-132 is somewhat trapezoidal with one well-smoothed, slanted facet. H76-133 is similarly shaped and has a pitted depression in one surface. H76-134 is subrectangular, and again there is a pitted depression on one surface and an abraded circular area on the opposite face. H76-131, from the kitchen floor in CG 90 on the Main Mound, is a large stone with knob-shaped handles and one flat facet measuring 9 x 20 cm.

Pebble rubber: H76-N112 (fig. 1c)

H76-N112 is an irregular limestone pebble from the floor of CF 58 room /2/, North Flat. Uneven areas on the apex and the bottom are more polished than the rest, but there are no real facets.

Flat rubbing stone: H76-N9 (fig. 1d)

This is a very flat, water-worn stone whose edges were probably used for light rubbing. It comes from the South Hill Industrial Area.

Discoidal handstones with pecked depressions: H76-N25, N144 (fig. 1e) and H76-104.

Three of these stones were recovered, two from the South Hill Industrial Area and on surface survey from FF 74 (the Twins). They have been pecked and ground to shape, but the depressions seem to be the result of wear rather than manufacture. It is possible they were used as anvils for some kind of fine hammering, though the nature of the task was probably not the same for all of them. H76-N144 is limestone, which though soft, will withstand impact well. Sandstone, the material of H76-N25, on the other hand, breaks easily and is unsuitable for heavy work, but is well suited for abrading. In fact, N25 has a small area on its periphery that is shallowly concave and very highly polished, as if from rubbing some resistant, convex material.

H3775 and perhaps H1684, reported by Schmidt (1937: pl. XVIII A, H3775, Hesār I and Pl. LXIV, H1684, Hesār III) seem to be the same type of object, though not from the same parts of the site. Schmidt calls H1684 a possible «drill head» in his catalogue, and if the depressions are smooth and show signs of rotary wear, that may be so. The stones from the 1976

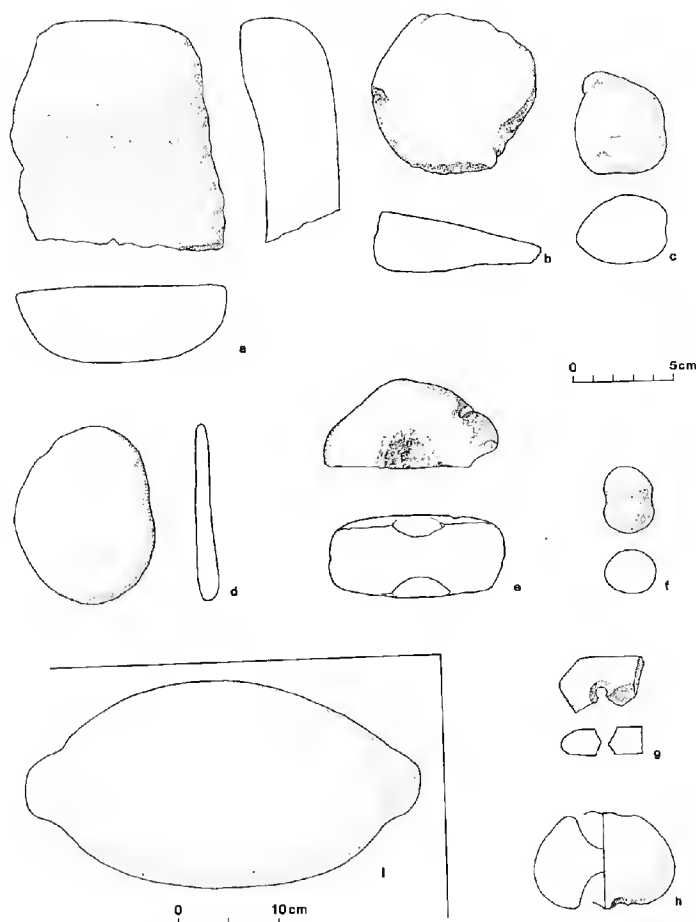


Fig. 1: Tappeh Hesār, 1976: Ground Stone Tools and Artifacts: a, H76-N1; b, H76-N2; c, H76-N12; d, H76-N9; e, H76-N114; f, H76-N60; g, H76-N24; h, H76-N138; i, H76-N131.

season, however, have pecked depressions and show no signs of rotary wear.

Grinding/pounding stone: H76-N48

H76-N48 is too fragmentary to say much about except that it appears to have been used for both pounding and grinding and may have been hemispherical in section. The rock is fire-altered and comes from the trash area in CG 90/5/ on the Main Mound.

Light Hammer stone: H76-N8

H76-N8 is a piece of quartz from the South Hill Industrial Area, irregularly flaked, battered and use-abraded along small areas of the edges and ends.

Small stone with worn depression: H76-25

This is a small (2.8 cm. diameter) flat stone, circular in plan, with a shallow depression in one surface and a deeper depression with rotation grooves in the other.

Stone with double, ground depressions: H76-N138 (fig. 1h)

H76-N138 is a well-shaped and polished limestone

object with deep, abraded depressions at either end. It was found on the Main Mound in CG 90 /6/. The edges of the depressions are chipped and flattened and at one point worn and polished on top of the chipping. Sharp, shallow pick marks on the exterior, especially toward the more globular end, are probably remnants of manufacture which have not been completely polished away. The stone's function is problematical; the depressions seem too rough to have been used for rotary motion, as with a bow drill, and too wide to represent an unfinished mace head. An apparently identical example is shown in Schmidt (1933: Pl. CXLII A, H323, Hesār III).

Stones with encircling groove: H76-N60 (fig. 1f) and H76-26

These are slightly flattened, oval stones with a shallow groove encircling the middle. The smaller one (H76-N60), 2.5 cm. in diameter, has slight signs of battering, and the groove is much smoother than the

rest of the surface, suggesting that it was used. H76-26, which was not available for examination, is recorded as showing heavy hammering at both ends whether from manufacture or use is unclear. It measures 5.0 cm. in diameter. A third example, intermediate in size and with no use marks, is reported by Schmidt (1937: Pl. LXIII, H1819, Hesār III). They may be weights which were suspended by their middles or they may have been mounted with a thong on a shaft for use as small hammers. If the latter, they must have been used on material soft enough to have left few or no marks.

Alabaster fragments: H76-N6, N47 and N51

H76-N6 is a fragment of worked alabaster, too incomplete to type, found on the surface near the Sassanian Mound. H76-N47 is a fragment of the « grip » portion of a handled disc of the type illustrated in Schmidt (1933: Pl. CXXXVI A, CLII, and CLIII A, all H174; 1937: Pl. LXII, H2895, H3492) and dated by him to Hesār IIIC. The surface is matte except for some areas of polish, as if from use, on the surface of the notch which forms the top of the grip, and along the edges of the disc's perimeter. For a recent discussion of the distribution of these and other types of alabaster objects excavated by Schmidt, see Dales (1977). H76-N51 is a stemmed plate fragment, complete examples of which are found in Schmidt (1933: Pl. CXXXVII, H176 and CXL, H176, H182; 1937: Pl. LIX, H2769, H3506, H3529 and fig. 124, H3529; all again dated to Hesār IIIC). Here only the join between the stem and the plate remains. Copper oxide has stained one broken edge. The disc and plate fragment both come from the top of CF 58 in the North Flat and belong to « Hesār IIIC ».

Pierced stones: H76-N3, N24, N110 and H76-24 (fig. 1g)

These stones are grouped here for convenience only; they have nothing in common except that they are all pierced. H76-N3 is a small disc (diameter 2.9 cm.), probably alabaster, with one convex surface showing wear around the hole, as if from the head of an attaching stud. H76-N24 has no signs of wear: the hole has been drilled through from both sides, and has circular ridges from the drilling process. H76-N110 is a fragment of a rectangular piece of white plasterlike material. H76-24 is a type usually called a « whorl ». It is slightly biconical in shape, with circles incised around both holes, the edges of which are chipped and worn. It was found on the floor of the kitchen in CG 90, on the Main Mound.

Beads and small, pierced stones: H76-N99; H76-38, 54, and 57

H76-38 and H76-54 are necklaces of 38 and 48 beads respectively. The beads are of crystal, carnelian and lapis. Both are from burials in the Main Mound. H76-N99 was found alone and is a thin, hexagonal disc, pierced slightly off center. H76-57 was also found singly and is a faceted, crystal pendant from CF 58 room /3/ on the North Flat.

Unworked stone objects: H76-N100 and H76-29

Two pieces of stone, though not worked, are included here because of their exceptional character. One (H76-29) is a fossil ammonite about 8 cm. in diameter. The other (H76-N100) is a small, thin rectangle of a talcose siltstone from the South Hill Industrial Area, smoothly polished but without obvious use marks.

XI. MINERAL TALC SAMPLES FROM TAPPEH HESĀR, 1976

M. James Blackman

Recent mineralogical examinations of archaeological material from a number of sites in the Near East have established that much of the material previously identified as steatite, a massive, gray to greenish, impure variety of the mineral talc, was in fact the mineral chlorite. This discovery has led to some confusion in the identification of these two minerals in the field. This investigation was undertaken to precisely identify the mineralogy of the material used in the bead and stamp cutting operation at Tappeh Hesār.

Partially worked bead blanks, stamp seal blanks and waste from the cutting process were examined. All the material came from various depths within the DF 09 sounding on the Main Mound (lots 4, 6, 7, 8, and 13; see Part VI). They were inspected microscopically and a representative sample was selected for x-ray diffraction analysis. Bead and stamp seal blanks with flat surfaces of sufficient size, about 5 x 5 mm., were mounted in the diffractometer and analyzed nondestructively. In the case of cutting debris and bead blanks without sufficient flat surfaces, small diameter holes were drilled in the unworked surfaces and the powder

from the drilling analyzed.

The x-ray diffraction examination of the selected pieces showed that the major mineral in all the samples was talc, $\text{Mg}_6(\text{Si}_8\text{O}_{20})(\text{OH})_4$. Almost every sample examined also contained varying amounts of calcite, CaCO_3 , either intimately mixed with the talc or as segregated veins and blebs. A few of the talc-calcite mixtures also contained small amounts of a second carbonate mineral, dolomite, $\text{CaMg}(\text{CO}_3)_2$. None of the samples contained detectable amounts of chlorite.

The color of the blanks and cutting debris ranged from light tan to dark gray. Most of the samples were, however, not uniform in color, but rather mottled shades of white, tan and gray. The hardness varied from 1 to 2.5 on the Moh's hardness scale due to the differing amounts of carbonate impurities in the talc. All the samples had the «soapy» feel typical of talc. The absence of schistosity or foliation in the rock appears to rule out talc or talcose schists as a possible source of the raw material. The source is therefore likely to be a massive talc-carbonate rock, possibly of local occurrence.

XII. THE SEALS OF TAPPEH HESĀR, 1931-1932

Leslie Bennett

Erich F. Schmidt lists 122 stamp seals excavated during the 1931-32 excavations at Tappeh Hesār in the selected catalogue published in 1937 (*Excavations at Tepe Hissar, Damghan* by Erich F. Schmidt, Philadelphia, The University Museum, 1937). The sample of seals from Hesār to be discussed consists of 73 illustrated by Schmidt in 1937, 26 seals illustrated in the 1933 preliminary report (« Tepe Hissar Excavations 1931,» *Museum Journal* 23 (4)), and 93 seals from The University Museum archives which have never before been published. Of these, the excavator identified 160 as belonging to Hesār I, 13 from Hesār II, and 19 from Hesār III.

The majority of the stamp seals have low, pierced handles, although a very small number are medallion seals or conically shaped. The frequency of these last two types of seals is less than ten in either case. Schmidt records that seals were made of baked clay, serpentine, gypsum, bitumen and, particularly during the final period of occupation (Hesār III), of copper.

Of the seals published in 1937, those from periods I and II were found in graves for the most part. There are two distinct concentrations of burials containing seals within the site – the first is in plot EH 13, and the second is within a contiguous group of plots (DH 34, 35, 36, 43, 44, 45, 46). The two areas lie on the eastern and southeastern edge of the Painted Pottery Flat. Twentyone seals were found in EH 13 and 54 seals were found in the DH areas from the sample of 95 seals of periods I and II listed by Schmidt (1937). The remaining 20 seals were scattered throughout the site in no discernable pattern. The find spots of seals of Hesār III (of which Schmidt mentions 19) occurred on the North Flat, Main Mound, Treasure Hill, and South Hill. The only concentration was that of 5 seals found on the North Flat (CF 37, 47, 57) three of which occurred in the Burned Building. Seals of period III were generally not found in burials, with the exception of H3515 and H4886, both of copper.

More can be said on the designs of the seals. Here the various design categories will be described, the changes which occur within the Hesār assemblage will be delineated, and a few comparisons will be made to those of Tappeh Sialk and Šahr-e Sūkteh.

The designs of the Hesār stamp seals can be divided into fifteen categories: (1) cross, (2) filled-cross, (3) concentric circles, (4) lines-and-circles, (5) wavy lines, (6) sun-pattern, (7) halved-pattern, (8) grid-pattern, (9) design-strip, (10) swirls, (11) people-and-animals, (12) people, (13) interlocking animals, (14) unusual shapes, and (15) blank seals. Each of these categories will be

described below. The illustrations presented here (figs. 1, 2) are of seals excavated during 1931-32 which have not been previously published. Often, however, the best examples of a category are to be found in the 1937 published report.

1 and 2). The cross and filled-cross categories can be seen as two variants of the same type. The reason for the division is that the vast majority of the crosses have designs which « fill in » the cross in such a manner as to accentuate the four angles at the center (H333, H937, H959, H1087, fig. 1, also Schmidt 1937: Plate XV, H3364, H4504). The simple cross category consists of stamp seals with only a simple cross design or with a design which does not emphasize the angles (H3339, H1291, figs. 2, 1). The orientation of the cross on the seal has not been taken into account; often it is diagonal. 3). The concentric circles category consists of those seals whose major design feature is circles within circles, whether they be a single or multiple set of circles on one seal (H3363, H987, H809, figs. 2, 1).

4). Fourteen seals displayed very rough lines and circles in no discernable pattern (H1251, H4475, figs. 1, 2); also 1937: Plate XLIX, H1765).

5). The wavy or zigzag lines category could quite possibly be split into two subcategories—angular and curved (H1203, H1012, H4280, figs. 1, 2; also 1937: Plate XV, H3376, H4596). Neither subcategory shows a decided predominance over the other in any period.

6). The sun pattern seals display a petal or corona-like outer edge, usually with one or two circles at the center (1937: 198, H3515; Plate XXVIII, H1785).

7). Halved-pattern seals are so categorized due to the line down the center of each seal which splits the design through the middle (H808, H1213, H1321, fig. 115). Often the design on each side mirrors the other. The orientation of the central line relative to the handle perforation was not noted but in the case of square or rectangular seals it bisects the seal from side to side rather than diagonally from corner to corner.

8). The grid category is just that—lines crossing one another at right angles to form a grid set at a right angle to the sides (H1235, fig. 1, also 1937: Plate XXVIII, H2882, Plate XLIX, H2582).

9). The design strip category was chosen to accommodate those seals which have a different, repetitive design between parallel lines which divide the different patterns from each other (H4405, fig. 2; also 1937: Plate XV, H2670, H4602).

10). Only one seal displayed the « swirls » type of design and appears out of character with the design

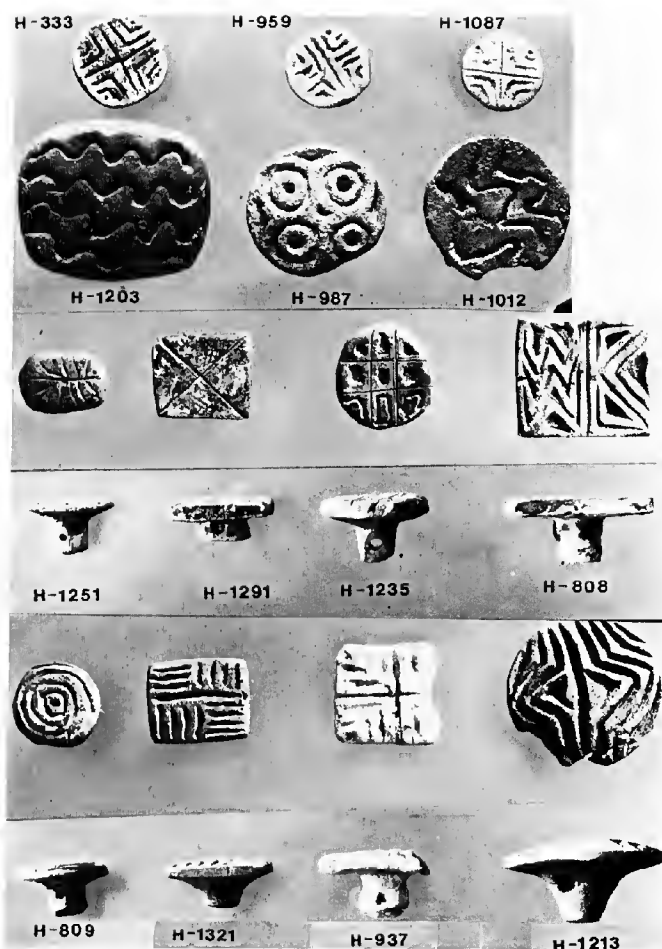


Fig. 1: Tappeh Hesār 1931-32: Stamp Seals

elements of the other seals at Hesār (1937: Plate XV, H2937).

11 and 12). People-and-animals or snakes (1933: Plate XCI, H20; 1937: 198, H4886) or just people (1937: 198, H3038) make up two other design categories. These representations of living things contrast with the purely geometric designs of the other seals and seem to be found exclusively in Hesār III contexts.

13). The seals in the interlocking animals category are distinctive in their intricate linkage of animal forms in such a way that, at first glance, the seals appear to display geometric patterns (1933: Plate CXXX, H458, H459, H720). The animals portrayed on these seals are more stylized than those on the people-and-animal category of seals.

14). Seals with unusual shapes were set into a separate category because of the singularity of these seals in contrast to the general round, rectangular, and square shapes of the majority (1937: 198, H2697, H2698).

15). Blank seals are also just as the name suggests—bare of decoration (H3746, H3717, fig. 2).

In looking at the collection of stamp seals from Hesār, it is obvious that a change in the kinds of designs present occurred between periods II and III. There is also a change in the location of the seals; those from Hesār III no longer come from burials. Although the small number of seals from Hesār II and III makes it difficult to draw conclusions based on straight numbers and percentages, the information available is suggestive of certain changes.

There is almost a complete lack of seals with representations of people-and-animals until Hesār III, when nearly 32% of the seals exhibit such designs (see Table 1). Only one example of a people-and-animal seal was identified by Schmidt as belonging to Hesār I. On the other hand geometric designs last, with varying frequencies, through all periods. The patterns tend to change very little in time.

Blank seals, swirl patterns, and design-strips occur only in Hesār I and make up only a small percentage of the total sample. No designs were exclusively limited to Hesār II. Only one seal type, that of unusual shapes,

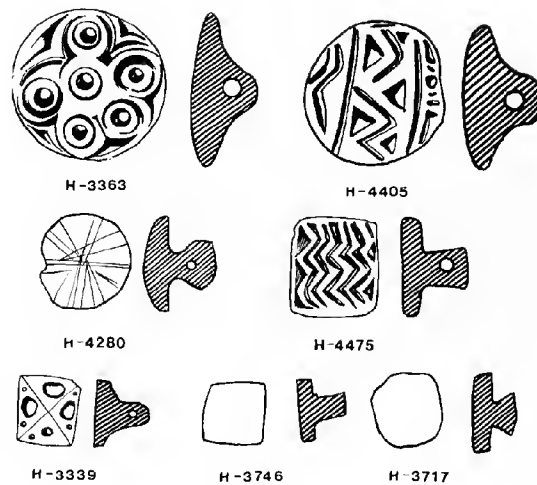


Fig. 2: Tappeh Hesār 1932: Stamp Seals

first appeared in Hesār II and occurred again in Hesār III. Seals having people and interlocking animal designs do not appear until Hesār III. Three cylinder seals occurred, two of which Schmidt identifies as the Mesopotamian variety (1937: 198, H892, H3710) and the third (1937: 198, H116) as perhaps Elamite or having affinities with the Indus (1937: 197 cf. pp. 141, 141a) (See Part VII).

The manner in which new designs were introduced in Hesār III while many of the old geometric patterns remained the same, reflect the change which is evidenced in the pottery at the same time. Despite the small samples from periods II and III, and in fact because old designs still appear even though the number of seals is drastically reduced, there is a feeling of continuity throughout all three periods at Hesār, although there are definitely changes occurring in Hesār III.

The early seals from Tappeh Hesār most resemble those from Tappeh Sialk near Kashan. Almost every geometric design found at Hesār is found at Sialk.

Absent from Sialk are the human and animal elements in the designs which occur in the final period at Hesār at a time when Sialk appears to have been unoccupied. The major differences between the two assemblages lies in the shape of the back of the seals. Sialk seals have low, nearly flat handles with a hole drilled through, giving the overall appearance of buttons (Ghirshman 1938: Plate LXXXVI).

In general, the seals from Šahr-e Sūxteh do not show much relation to the Hesār material. Viewing illustrations published by Lamberg-Karlovsky and Tosi (1973) and Tosi (1969), it becomes apparent that the seals from Šahr-e Sūxteh vary widely in their shapes: they can be round, square, rectangular, or, just as frequently, unusually shaped. The designs are symmetrical and geometric but in patterns resemble those from Turkmenistan rather than those from Hesār. However, the face of seals at Šahr-e Sūxteh often have a « mirrored-quartered » design—meaning the design in diagonally opposed corners mirror one another (Lamberg-Karlovsky and Tosi 1973: fig. 39). Tappeh Hesār

TABLE 1: TAPPEH HESĀR SEAL DESIGN CATEGORIES

Category	I	II	III	I	II	III
cross	9	0	2	5.6%	—	10.5%
filled cross	65	4	2	40.6	30.8	10.5
concentric circles	8	1	3	5.0	7.7	15.8
people	0	0	2	—	—	10.5
individual shape	0	1	2	—	7.7	10.5
interlocking animals	0	0	3	—	—	15.8
rough lines and circles	12	2	2	7.5	15.4	10.5
grid	3	1	1	1.9	7.7	5.3
sun	1	1	1	0.63	7.7	5.3
wavy lines	17	2	0	10.6	15.4	—
empty	7	0	0	4.4	—	—
halved	33	1	0	20.6	7.7	—
swirls	1	0	0	0.63	—	—
people and animals	1	0	10	0.63	—	5.3
design strips	3	0	0	1.9	—	—
total # of seals	160	13	19			

also has some seals with mirrored designs, but they are of one half of a seal mirroring the other (1937: Plate XV).

Twelve published seals from Turkmenistan (Megaw 1976; Pumpelly 1908) vary widely in shape, ranging from rectangles and crosses to goats and spectacular three headed beasts (Megaw 1976: 256). The geometric designs which occur bear a slight resemblance to Hesār, with concentric circles, crosses, and mirrored designs present. Nevertheless, the affinity between the seals of Hesār and Turkmenistan is not very striking. The seals of neighboring Bactria are also different from those of Hesār. Bactrian seals (Amiet 1977) emphasize human

and animal design elements. Often a single person or animal will dominate the design of a seal (Amiet 1977: Plate IV), unlike those at Hesār, which are mostly portrayals of more than one figure (1937: 198: H4886, H3038).

The seals from Tappeh Hesār, then, have few affinities with seals from areas to its north, north-east, or south-east. Only Sialk has a collection of seal designs truly resembling those of Hesār. The complete publication and new excavations of sites on the central Iranian plateau may yet reveal a larger regional distribution of Hesār-type seal designs.

XIII. AN EVALUATION OF THE TAPPEH HESĀR 1931-1932 SKELETAL SAMPLE

George W. Nowell

The available skeletal material from the archaeological site of Tappeh Hesār, Iran, is representative of neither the excavated sample nor the prehistoric populations of Tappeh Hesār and is consequently of little value for the generation of demographic statistics. The results of the ageing of the available dental sample by the Miles ageing method support this finding.

The skeletal material discussed herein came from the prehistoric site of Tappeh Hesār, Iran and dates to between ca. 5,000? and 1,800 B.C. (see Part XVI).

None of the few skeletal remains from Tappeh Hesār dating from the Partho-Sasanian or later periods is considered in this report. The site was excavated by Erich F. Schmidt in 1931 and 1932 (Schmidt 1933, 1937) and the skeletal material was studied in part by Krogman (1940 a, b, c) and Kappers (1934).

Although Schmidt (1937) recorded the excavation of 1637 burials, Krogman (1940 a,b,c) studied fewer than 250 individuals and the author found skeletal remains of only 479 individuals in the collections of The University Museum of the University of Pennsylvania (Table 1). The generally excellent condition of the bones and their small number relative to the total excavated population suggest that Schmidt only brought to the United States the best-preserved bones. Krogman (personal communication) had been confident that he had been sent *all* the skeletal material available from Tappeh Hesār.

All 268 individuals assigned to Tappeh Hesār I-III and represented by at least one ageable dentition were aged by the author using the Miles method (1963) based on molar wear (Nowell 1978).

Invalidity of the Sample for Generating Demographic Statistics

The basic conditions necessary for the generation of demographic statistics from archaeological skeletal remains are:

(1) the sample must accurately represent the original populations of the cultural levels of the site, and (2) each skeleton must be attributable to its proper level

in the site. The evaluation of the present skeletal sample in these terms indicates that neither condition is adequately met.

There is no assurance in the final site report (Schmidt 1937) that the skeletal population excavated was not biased with respect to age or sex by cultural factors regulating the place of interment since all of the skeletal material was found on the elevated portions of the site and Schmidt (1937) did not test extensively for alternate burial locations in the unexcavated portions of the site and in the surrounding plain. Both Krogman (1940a) and Schmidt (1937) note a tremendous predominance of males over females in each level and it can not at present be determined why the Tappeh Hesār skeletal sample appeared to be biased in favor of males. No attempt was made to reassess the sex of the individuals in the sample during this study.

As noted above, only a small fraction of the individuals excavated were represented in the available skeletal sample. Even fewer were studied by Krogman (1940 a,b,c) and Kapper (1934). A comparison of the results of this study with Schmidt's (1937) figures shows a great disparity in the number of juveniles, aged 0-6 years, in the entire present sample (19 or 4%) compared to the number excavated during the second working season alone (151 of 205). There may be a similar bias against the presence of older individuals (45+ years of age at death) in the sample available for analysis. The extent of these possible biases is unconfirmable because of the unreliability of the excavator in determining the ages the skeletons in the field and the lack of individuals represented by dentitions with molars ageable to 45+ years by the Miles method.

Also, the excavator's field records and reports often do not attribute individual burials and skeletal materials to specific cultural sublevels.

Thus, sampling biases involving the skeletal materials both as excavated and as retained for study preclude the use of the available materials to make valid conclusions concerning the demography of the cultural populations of Tappeh Hesār I-III.

TABLE 1: INVENTORIES OF THE HESĀR I-III SKELETAL MATERIAL

	Krogman (1940a)	Present study
Crania	193	211
Mandibles	138	238
Post cranial	58*	299**
Individuals represented	216	479

* Parts of fifty-eight individuals.

** Parts of 299 individuals.

Age Distribution of the Sample

Because this sample is invalid for the development of valid demographic statistics for the site of Tappeh Hesār, no discussion of the distribution of this sample by age at death is presented.

Conclusion

This evaluation supplements the work done by Krogman (1940 a, b,c) in two respects. First, a

significantly larger number of individuals was studied, 268 versus 193 by Krogman. Second, and more importantly, the information available to Krogman did not enable him to criticize the value of the sample for generating valid demographic statistics. The available skeletal and dental samples from Tappeh Hesār I-III do not represent the prehistoric populations of the site and cannot be used to generate meaningful demographic statistics.

XIV. RECENT RESEARCH IN PHYSICAL ANTHROPOLOGY ON TAPPEH HESĀR, IRAN

Ted A. Rathbun

The basic analyses of the physical characters, demography and pathology of the populations from Tappeh Hesār were conducted by Krogman (1940 a,b). The metric data have been used for comparisons in analyses of relative variation of Southwest Asian populations by Cappieri (1969, 1973) and Findel (1974, 1978). These univariate analyses suggested a relative homogeneity and stability of the populations in the area. Rathbun (1972) documented a strong commonality of the Hesār populations with the Iron Age Hasanlu skeletal groups. A later multivariate metric analysis (Rathbun, 1975) of 14 Southwest Asian populations illustrated that the morphological features of the Tappeh Hesār males were closely affiliated with those of groups from India and Turkmenia. The females from Tappeh Hesār, however, showed closer biological distances to samples from Anatolia, Hasanlu IV, and Kiš, Iraq. In this study the males in all the samples appear to show localized tendencies, while the females appear more homogeneous throughout the area. A possible demographic explanation is suggested.

Demography may play an important role in explaining the population dynamics of area populations. Nowell (1971, 1978) analyzed the dentition of the Tappeh Hesār populations and assigned specific ages to the individuals. He found that the average age at death for the entire sample was between 25 and 27 years. For the adults he found an average age at death between 29 and 32 years. Unfortunately, he did not analyze the data according to the sex of the individual.

His 1978 publication also makes the point that due to selective retention of burial remains there is no assurance that the material is representative of the population at the site and hence cannot be used to generate accurate, meaningful demographic statistics.

As part of a larger project, Rathbun examined the Hesār collection at The University Museum of the University of Pennsylvania during the Fall of 1977. He collected information on the pathologies and inventoried the collection for 59 cranial and 33 infracranial nonmetric traits.

The initial analysis of the Hesār non-metric variation as part of the regional synthesis (Rathbun, 1979:473) supported the earlier metric analysis and revealed greater heterogeneity for the males. Although Nowell has called attention to the problems of representativeness of the samples from Hesār, the multivariate and cluster analysis of the cranial non-metrics revealed that the Hesār II males were morphologically similar to the Hasanlu V, Dinkha Tepe II, and

Kiš VI males. Hesār III males were closest to the Hasanlu IV males, and Hesār V males showed closest affinities to Hasanlu III. The analysis of the female variation of discrete traits revealed basic similarity between Hesār II and III samples, but the Hesār V group was closer to those from Kiš and Nippur in Mesopotamia and Hasanlu II and III.

The infracranial variation generally followed the relationships of the cranial traits, but the population distances were not identical. The patterns of infracranial discrete traits appear to be more strongly influenced by environmental, cultural and developmental factors and may not as accurately reflect the morphological relationships.

Although there were no clear cut time-space patterns in the areal analysis of cranial traits, the males were relatively more localized. The females reflected a wider general homogeneity. A slight trend for localization of the females appeared for the infracranial traits. However, population and sex differences of local variation appeared more clearly in the metric data. If the nonmetric analyses continue to prove reliable, the technique should be especially useful since it can be used on material that is too fragmentary for metric analysis, a problem which is legion in Southwest Asian skeletal collections.

The pathological conditions of the skeletal material may also reveal important clues to the demographic conditions and health status of the societies. Beside the usual pathologies of the dentition, trauma, and degenerative age changes (Krogman 1940b), four individuals from Period III at Tappeh Hesār may have suffered from some form of short limb dwarfism. These individuals (one male, one female, and two sex undetermined) all have strikingly short limb bones. The muscle attachment areas are significantly larger than other individuals, especially on the humerus. The humeri also exhibit classic changes of the humeral head deflected dorsally and downward. Based on Krogman's data, the stature of males at Tappeh Hesār was 170 cm, and females 157 cm, to 154 cm. Although Krogman (1940) recorded measurements for two of the crania, none of the skulls were presently available for study. Comparative studies and x-ray examination of the long bones are currently underway.

The Tappeh Hesār material was discussed in the symposium «Skeletal Features of Southwest Asian Populations» at the 1980 meetings of the American Association of Physical Anthropologists at Niagara Falls, New York.

XV. ARCHAEOLOGICAL SURVEY OF THE DĀMGHĀN PLAIN, NORTHEAST IRAN, 1976-1977

Kathryn Maurer Trinkhaus

In conjunction with the 1976 Tappeh Hesār excavation, the author undertook a survey of the valley and alluvial fan of the Dāmghān river and immediately adjacent areas. Between September 1976 and January 1977 all visible mounded sites were located and mapped and surface collections of pottery and other artifacts were made. Smaller areas were chosen for more intensive walking survey to check for the presence of sherd scatters and other unmounded features.

The total area surveyed extends north to south from the Cheshmeh Ali spring to the southern end of the gorge of the Dāmghān river and through the first major foothills to the northern edge of the salt desert south of Dāmghān. It extends east to west from the modern villages of Hoseynabad to Ebrahimabad. The southern extent is roughly marked by the villages of Hajjiabad, Abdia, Zargerabad and the Bagh-e Badur. In addition, a rapid survey was made of the valley northeast of the Dāmghān river, from the Cheshmeh Ali spring to Chahar Deh.

The total area surveyed includes 450 to 500 square kilometers. A total of 155 locations were mapped (fig. 100) and representative surface collections were taken. The final site count will be slightly smaller since large sherd scatters were divided to ensure adequate sampling. Several days were also spent visiting sites which were located by Erich Schmidt (map in The University Museum archive) between Hoseynabad and Mehman-dust to the east and between Ebrahimabad and Qusheh to the west. Eleven mounds were located; surface collections were taken from four of particular interest.

In the valley and alluvial fan of the Dāmghān river all mounds visible on air photograph or on the ground were visited. Given the small size of the area and the abundance of secondary roads, this coverage proved satisfactory. Walking surveys were made of the lower valley on the left bank of the Dāmghān river, the narrow southern gorge of the same river and selected area of the major geomorphological zones of the Dāmghān plain.

The discussion of site distribution will be made clearer if a brief description of major geomorphological features and land-marks of the Dāmghān area is given. The Dāmghān plain is watered by a river which originates in the Elburz mountains to the northwest of Dāmghān. Its sources are four springs at the northern end of a broad valley oriented northeast by southwest. These springs combine to form the Namak river. Downstream, waters from the Cheshmeh Ali spring flow into the Namak river and the larger stream becomes the Dāmghān river. At this point, the river leaves the

upper valley and flows through a narrow lower valley about 2 km. wide by 15 km. long. The lower valley narrows again and the river flows through a gorge about 100 m. wide by 3 km. long before opening out into the plain.

The plain itself is a typical alluvial fan, having a broad, crescent-shaped gravel flat along the foothills. The gravel flat is otherwise waterless and unsuited for agriculture. No sites were found in this area, except those immediately along the river. To the southeast of the gravel flat is an extensive clay flat, suitable for agriculture with irrigation. Most of the sites are located on this clay flat. Further to the southeast are a band of salty clay and the *kavir* itself. Since the Dāmghān plain has no external drainage, a salt flat has formed in the southeastern corner. Although the salt flat itself is not large, the area of salty soils is more extensive and reduces the arable land of the plain considerably. The band of salty clay is used today for marginal farming and for grazing goats and camels. There are several artesian wells which support orchards in this zone and a smaller number of sites are found here. The *kavir* proper was not surveyed.

The earliest pottery recovered by the survey appears to be contemporary with the lowest levels of Tappeh Hesār. This pottery occurs on thirteen sites, three of which (sites 002, 003 and 027) are small mounds immediately to the south, southeast and east of Tappeh Hesār. Two sites, 132 and 133, are northeast of Tappeh Hesār along a major streambed. The rest of the sites are located around the edges of the alluvial fan. For example, sites 103, 104 and 105 are northeast of the village of Mayan. Sites 106 and 123 are north of the first major canal of the Dāmghān river and outside the area of major alluviation. Site 155 is Tappeh Hesār itself and sites 137 and 142 are to south of it. The last two sites have standing walls of later date; the Hesār-like pottery appear to be intrusive.

The pottery on these sites resembles the painted wares of Hesār I. There are only about a dozen specimens of buff ware among all the sites. The majority of sherds are red ware, varying from crumbly, chaff-tempered to homogeneous with no visible temper. Approximately one-third have painted designs in black or brown-black. These vary from simple, broad lines to complex, finely-painted motifs. One animal figurine (caprid or bovid) in red ware was found at site 104. A smaller quantity of undecorated grey ware was found. It varies from crumbly with heavy grit temper to homogeneous with no visible temper. The fabric of these sherds bears a close resemblance to the Parthian

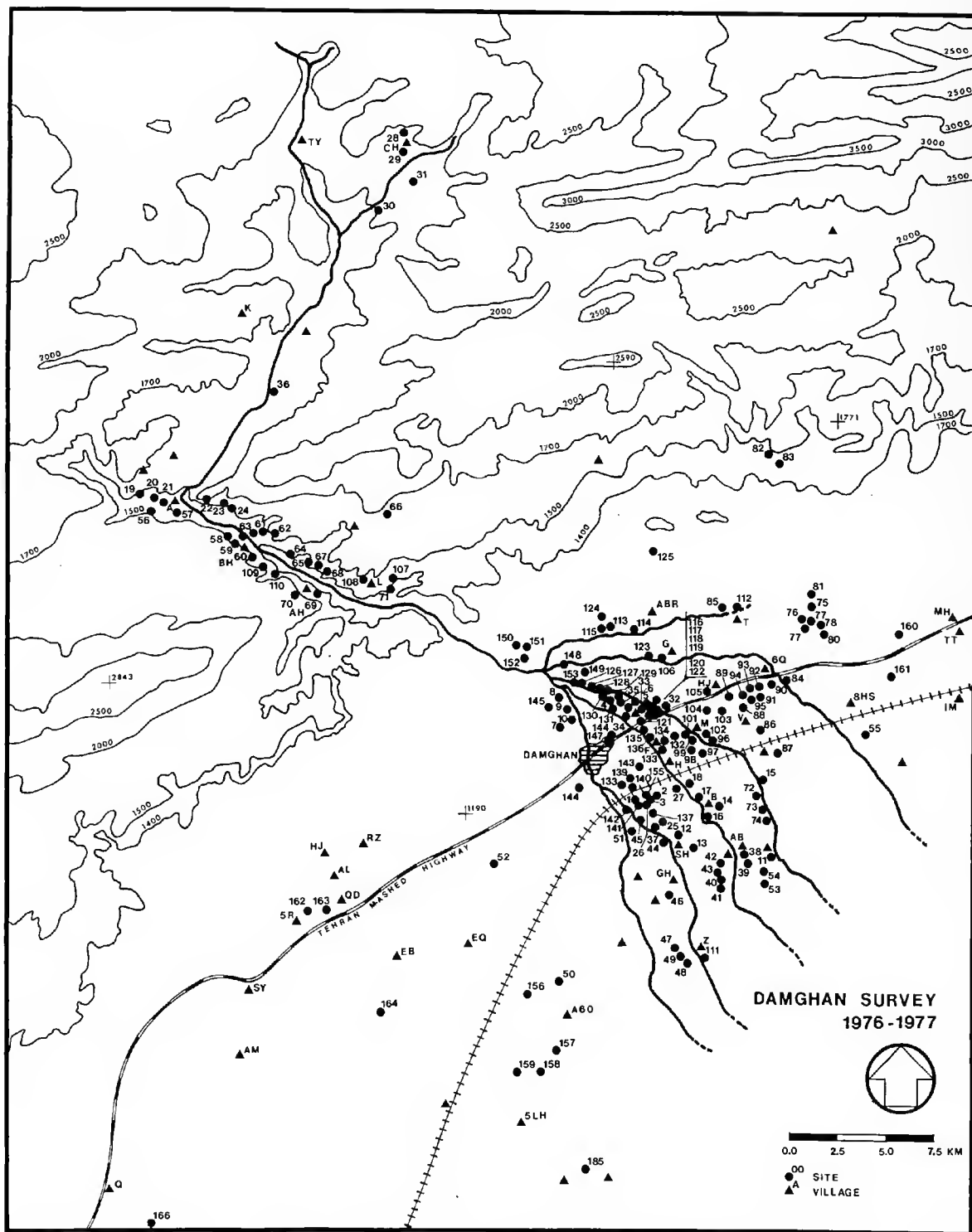


Fig. 1: Map of Sites Surveyed in the Dāmghān Plain, 1976-1977.

grey wares. No distinctive black burnished ware was found.

The scarcity of sites with pottery similar to that found at Tappeh Hesār suggests that the area was not heavily settled at this time, that Tappeh Hesār dominated the area to the virtual exclusion of smaller sites or that additional sites existed but have been buried beneath the alluvium. The location of five sites around the alluvial fan and the depth of the base of Tappeh Hesār support the third explanation. The greater scarcity of sites with grey ware is more difficult to account for. It may be that grey ware was manufactured in smaller quantity or for a shorter period of time. If there were additional grey ware sites, it is possible that they were located near the center of the alluvial fan, perhaps clustering around Tappeh Hesār. It is also possible that Tappeh Hesār reached something approaching its present large size at this time and that few smaller sites co-existed with it. The absence of any site contemporary with Tappeh Hesār in the valleys above the Dāmghān plain is striking and may reflect the dominance of Tappeh Hesār. However, if sites were occupied in the valleys, they may have been eroded away by the river. The river in both valleys is narrow and fast-moving, tending to cut into its banks. At present, there is insufficient evidence to favor any one of these possible explanations.

Abbreviations of Modern Village Names on Map

A = Astaneh
 AB = Abbasabad
 ABd = Abdia
 ABR = Abulbargh
 AH = Ahvanu
 AL = Aliabad
 AM = Amirabad
 B = Beram
 BH = Baba Hafez
 BHS = Bagh-e Hoseynabad
 PQ = Paq
 CH = Chahar Deb
 D = Dāmghān
 E = Ebrahimabad
 EQ = Eqbalieh
 F = Firuzabad
 G = Gaz
 GH = Ghaniabad
 H = Heyderabad
 HJ = Hajjiabad
 IM = imamzadeh
 K = Kalahtch
 L = Labrud
 M = Mayan
 MH = Mehmandust
 Q = Qushch
 QD = Qodratabad
 RZ = Raziabad
 SH = Shamsabad
 SLH = Sulhabad
 SR = Shirashian
 SY = Seydabad
 T = Taq
 TT = tomb tower
 TY = Tuyeh
 V = Vanerzan
 Z = Zargerabad

It is unlikely that surface survey will locate additional sites of this period. Excavation of one or two of the existing sites might prove useful; these sites appear to be small but may extend some distance underground, as does Tappeh Hesār. Some form of remote sensing is the only alternative means of locating buried sites but, given the small area, the lack of proof of the existence of buried sites, the predominance of Tappeh Hesār and its recent re-excavation, there is little justification for a determined search.

A gap in the sequence occurs after the period associated with Hesār-like pottery. There are no sherds or sites which can definitely be assigned to the period between 1500 BC and 250 BC; the next types which were identified are Parthian. It is possible that there were no major settlements and that small, or briefly occupied, sites were located on the alluvial fan. These would subsequently have been buried under the alluvium. It is also possible that the pottery of this period is sufficiently poorly known that it has been confused with later materials. Although the period is a long one, this is not impossible. The localized characteristics of this pottery and its resistance to change are apparent at Tureng Tepe, where it is found in stratigraphic sequence, and in the cemetery at Khorvin, the chronological limits of which are not clearly defined. At present, it can only be said that the gap is not satisfactorily explained, adding the caution that some of the material attributed to the Parthian period may be earlier.

Sites with pottery attributable to the Parthian period form several clusters in the survey area. One of these is located northeast of Dāmghān and includes eight mounds with Parthian sherds. Two of these mounds were excavated by Erich Schmidt during his 1931-1932 excavation seasons at Tappeh Hesār. Both mounds (sites 005 and 006) appear to be single structures rather than accumulations of living debris. In this they resemble several of the mounds at Sar-e Qumis, although they are somewhat smaller. Schmidt unfortunately published only brief notes on these excavations and there is little additional information in the archive of The University Museum in Philadelphia. However, the mounds may have been religious structures of some sort. Near sites 005 and 006 are six smaller mounds and several sherd scatters which have Parthian pottery. No excavation has been undertaken at these sites; surface collections were taken from all of them during the survey under discussion.

A second cluster of Parthian sites is located south of Tappeh Hesār near the modern village of Shamsabad. In this area there are four mounds (sites, 12, 13, 15 and 45). The purpose of this cluster is not clear. Unlike the one mentioned above, it is not easily reached by canals from the river, though one of the longest modern canals supplies Shamsabad. It is not on prime agricultural land, although it is above the heavily salt-covered zone. The area is within one kilometer of the salty clay zone used today for desert grazing.

In between these two clusters are three relatively isolated mounds (sites 27, 90 and 140). In addition, there is one small mound near the northern end of the upper valley, near the modern village cluster of

Chahar Deh, which has Parthian pottery. (It should be noted that Chahar Deh appears on the map as three villages; the fourth one has been abandoned. Although the villages have individual names, they are usually referred to collectively). At present, there is no obvious explanation for the presence of these relatively isolated sites. The lower valley has no sites with Parthian pottery.

The Parthian pottery assemblage is composed of red, buff and gray wares which bear a strong resemblance to materials of similar date from Sahr-e Qumis and Tureng Tepe. Red wares are the most common and range from homogeneous fabrics with no visible temper to crumbly, heavily grit tempered fabrics. With the exception of the coarse sherds, most redwares are burnished and a high percentage appear to be handmade. Buff wares are less common and fall into two general categories. One of these is a moderately heavily grit tempered, unburnished and wheelthrown ware. The other is a homogeneous, apparently untempered, often burnished and handmade fabric. Grey ware occurs in a homogeneous, apparently untempered, often burnished ware.

Settlement during the Sassanian period is both more widespread and more nearly uniform than during the Parthian period. There are no clearly defined loci of settlement. The Sassanian palace near Tappeh Hesār, excavated by Erich Schmidt during his 1931-1932 seasons at Tappeh Hesār, is the only significant architectural feature of this period and, although Sassanian pottery is present on three sites near the palace, it appears to the southeast of the palace, or below it with respect to the drainage pattern. The standing walls of these sites seem to have collected sherds eroded out of the palace and out of Tappeh Hesār during strong spring floods. The third site, site 138, is to the north of the palace and of Tappeh Hesār. Both of the latter sites appear to have been quarried for fill for the foundations of site 138.

Along the northern border of the *kavir*, in the salty clay zone, there is an area of sites with Sassanian pottery. At least two of these also have traces of fortification. Site 011, Tepe Badur, is rectangular and has four projecting towers or buttresses, one at each corner. Site 039, Tepe Abbasabad, is circular with a deep depression in the center and lacks any trace of interior walls. It appears to be a ring wall with four or six buttresses around the outside. There is one small, relatively isolated mound, sites 037, which lies between the Sassanian palace and the area of sites along the *kavir*. A second isolated site, site 095, is located in the eastern part of the survey area, near the modern village of Vamerzan. This site is a localized gravel patch with indistinct wall traces and pottery of several periods, predominantly Sassanian.

Additional Sassanian sites occur along the river upstream from the modern headworks. Two mounds, and a low wall, sites 150 and 151, associated with an indistinct linear mound, possibly another wall, site 152, are located here. Although there are no canal traces in this area which can be definitely attributed to the Sassanian period, it may be reasonable to suggest that these sites had something to do with water control

features. A small mound having Sassanian pottery, site 115, is located to the east of these sites and lies along a major modern canal. The association of site 115 with a large modern canal may be relevant since the build up of silt from the four major canals of the Dāmghān river, clearly visible on airphotographs and on the ground, suggests that the position of the canals has been stable for a considerable time. The movement which has occurred has been steady and in a predictable direction. An attempt is being made to estimate the rate of movement.

In the valleys above Dāmghān, a large and strategically placed mound with Sassanian pottery is located at the head of the lower valley, southwest of the Cheshmeh Ali spring. This site, 021, is well-placed to control access to and from the valley. Sassanian pottery is found in three sherd scatters between the villages of Baba Hafez and Ahvanu, as well as at the base of Kuh-e Ahvanu (site 070), a steep outcrop with hilltop fortification immediately west of the village of Ahvanu. In the upper valley, Sassanian pottery is found on two mounds near the village cluster of Chahar Deh (sites 028 and 030).

The pottery found on Sassanian sites follows the same general pattern as the Parthian wares. The most striking differences are the increased frequency of wheel-thrown over handmade vessels and the relative rarity of burnished sherds. Other forms of surface decoration, such as incising, applique and stamping, are much more common. A detailed study of the Parthian and Sassanian ceramics is in progress and will document the development of the sequence as well as subdivide it for closer dating of these sites.

A late Sassanian-early Islamic phase has been defined solely on ceramic grounds. It includes those sites which have unglazed red and buff wares similar but not identical to those of Sassanian or earlier date. This group cannot be considered an exclusive chronological period since it overlaps both the end of the Sassanian sequence and the beginning of the ninth and tenth century AD period. The last is defined by the presence of glazed wares similar to those found at Nishapur. Late Sassanian-early Islamic unglazed wares occur throughout the survey area. They are found on two mounds near the Chahar Deh village cluster, sites 028 and 030, and on the only mound in the center of the upper valley, site 036. They are found on a mound and sherd scatter complex, sites 056 and 057, at the head of the lower valley. Four of the sherd scatters near the village of Baba Hafez contain pottery of this sort, as does the fortified site on Mansur Kuh, site 066, two sherd scatters near the gorge of the river and the fortified site on Kuh-e Labrud, site 107.

On the plain, sites with this pottery show no distinct clustering but are scattered throughout the main drainage area of the Dāmghān river, as well as on three sites to the southwest, sites 050, 162 and 164. The southwestern area has no access to water from the river and is supplied entirely by *qanats*. This is the first period during which a number of sites appear in the *qanat*-supplied area. (There is one Parthian site in this area, site 052). Although the sites are more evenly spaced than in earlier periods, they are concen-

trated in the central and northern plain, nearer the divergence of the river into separate irrigation channels. Only three sites, 041, 187 and 141, are located further to the southeast and nearer the desert.

The succeeding period is characterized by recognizable Nishapur glazed ceramics. A marked change in settlement pattern can be seen in this period; the drainage area of the river on the plain has only eight sites. Three of these are within the later fortification east of the village of Baq. The remaining five are scattered around and to the south of Dāmgān. Only one is located as far south as the Shamsabad-Abbasabad area. On the other hand, these ceramics occur on one site in the upper valley, site 030, and on one mounded site and seven sherd scatters in the lower valley. There is an obvious concentration not only in the lower valley but in the upper half of that valley, between the Cheshmeh Ali spring and the two outcrops which narrow the valley above Ahvanu. One may speculate that the change is due to a need for defense since it occurs at the time when the new administration in Xorasan was making serious inroads into Persian strongholds in Tabaristan (prior to 800 AD).

A broadly defined period including pottery of the eleventh to the fourteenth centuries shows a reversal of this pattern. Settlement was again spread over the entire survey area. Two sites in the upper valley were occupied, sites 028 and 036. The head of the lower valley, near Cheshmeh Ali, appears to have been abandoned but the rest of the lower valley was moderately heavily settled. Eight sherd scatters between Astaneh and Baba Hafez, two mounded sites, sites 068 and 069, and three hilltop fortifications have pottery of this period. The use of the fortifications of Mansur Kuh, site 066, Kuh-e Ahvanu, site 070 and Kuh-e Labrud, site 107, suggests a serious defense of the lower valley. The period is too long, however, to determine whether these forts were used simultaneously or in succession. The plain below has a relatively even cover of sites, 36 in all, which form no distinct clusters. In addition, there are four sites to the southeast in the *qanat*-supplied area.

A second broadly defined period extending from the late fifteenth century to the end of the eighteenth century shows a slightly different settlement distribution. Settlement of the upper valley was limited to one site, 028 near Chahar Deh. In the lower valley, only three mounded sites, 020, 057 and 108, two fortified sites, 062 and 066, and one sherd scatter, 023/024, have pottery of this period. The plain was fairly densely

settled, however. Thirty-two mounds and sherd scatters have this pottery. Again, there is no obvious focus of settlement but an even scatter of sites. Three of these are located near the edge of the *kavir*, 040, 049 and 051, and six are to the southwest in the *qanat*-supplied area, 158, 159, 162, 163, 165 and 166.

The modern (nineteenth and twentieth centuries) period is amply represented with 82 sites. These are relatively evenly spread over the plain, showing no obvious tendency to cluster. As during the preceding period, most of the sites are on the plain with sparse settlement in the lower and upper valleys. The relatively good preservation of walls allows the observation that the most common settlement feature is the walled compound. In most cases, these seem to be field enclosures since they have few traces of internal walls and relatively little pottery. Many are plowed and planted today. The difficult and dangerous living conditions of this area during the nineteenth century produced walled structures for security, rather than clustering or decrease in numbers of settlements or relocation in the mountain valleys.

The outline above gives some of the general trends of settlement distribution in the Dāmgān area from the third millennium BC to the present. As mentioned above, a detailed study of Parthian and Sassanian ceramics is in progress and will allow more accurate dating of sites in these periods. When these long periods have been subdivided, more accurate conclusions concerning the distribution of settlement can be drawn. Research into several natural features of the Dāmgān plain and their effect on settlement is also in progress. The rate and direction of movement of the main irrigation canals and the possible northward movement of the salty border of the *kavir* are of particular interest. When the Dāmgān area and its local solutions to problems of settlement distribution and land use are better understood, it will be useful to put the area into its historical perspective. Dāmgān has never been an important focus of administrative activity and cannot solve any of the outstanding problems of the organization of pre-Islamic empires in Iran. The area did function as a small but significant peripheral center, however. As a stop on the east-west trade route, as a small province or as a border area between two larger provinces, as a outpost on the northeast frontier of several empires, the Dāmgān area adds to an understanding of the contacts, peaceful and warlike, between the northeast corner of those empires and their Central Asian neighbors.

List of Sites

Number	Name or Description	Period(s) of Pottery Represented on the Site Surface
DN-001	Sassanian palace near Tepe Hesār	Sassanian
DN-002	small mound SE of Tepe Hesār	Hesār I-III
DN-003	small mound S of Tepe Hesār	Hesār I-III
DN-004	mound W of Nareshan	Parthian and Sassanian
DN-005	Tepe Nareshan	Parthian
DN-006	Tepe Nareshan	Parthian
DN-007	enclosure with water channel NW of Dāmgān	11-24c, 16-18c, AD
DN-008	Ja-ye Dakhsh	11-14c, 16-19c, 20c AD
DN-009	sherd scatter near Ja-ye Bakhsh	19-20c AD
DN-010	small mound (possibly a kiln) N of Dāmgān	19-20c AD

List of Sites

Number	Name or Description	Period(s) of Pottery Represented on the Site Surface
DN-011	Tepe Badur	Sassanian
DN-012	Tepe Shamsabad	Parthian
DN-013	small mound SE of Tepe Shamsabad	Parthian
DN-014	Tepe Cholesar	19c AD
DN-015	Tepe Sefid	Sassanian
DN-016	sherd scatter W of Tepe Cholesar	Sassanian 18-19c AD
DN-017	Qaleh Musallah	19c AD
DN-018	wall remains NW of village of Beram	16-18c, 19c AD
DN-019	Cheshmeh Ati, Qajar building	19c AD
DN-020	small mound near Astaneh	early Islamic, 18-19c AD
DN-021	large mound near Astaneh	Sassanian
DN-022	sherd scatter near Astaneh	9-10c AD
DN-23		
DN-24	sherd scatter near Baba Hafez	9-10c, 11-14c, 16-18c AD
DN-025	small mound N of Tepe Shamsabad	Parthian
DN-026	standing structure S of Tepe Hesār	16-18c, 19c AD
DN-027	small mound NE of DN-026	Hesār I-III, Parthian
DN-028	large mound near Chahar Deh	Sassanian, Early Islamic (may be intrusive), 11-14c, 16-18c AD
DN-029	tower above Chahar Deh	Parthian, 19c AD
DN-030	mound SW of Chahar Deh	Sassanian, Early Islamic, 9-10c AD
DN-031	wall complex SW of Chahar Deh	not an independent site
DN-032	standing structure E of Dāmghān	19-20c
DN-033	small mound NW of Nareshan	Parthian
DN-034	small mound S of DN-033	Parthian, 18-19c AD
DN-035	small mound NW of DN-033	Parthian
DN-036	mound near Kalahteh	late Sassanian-early Islamic, 11-14c AD
DN-037	mound NW of Shamsabad	Sassanian, 11-14c AD
DN-038	small mound S of Abbasabad	9-10c, 11-14c AD
DN-039	Tepe Abbasabad	Sassanian
DN-040	Tepe Shaman	11-14c, 16-18c, 19-20c AD
DN-041	qaleh S of Tepe Shaman	Sassanian, early Islamic, 11-14c, 19c AD
DN-042	wall traces N of DN-040	19c AD
DN-043	small mound N of DN-040	11-14c AD
DN-044	small mound SE of DN-037	19-20c AD, may have Parthian &/or Sassanian intrusion
DN-045	small mound NE of DN-037	Parthian
DN-046	Tepe Verkian	late Parthian-early Sassanian
DN-047	Tepe Piran	11-14c, 19c AD
DN-048	Tepe Jibran	11-14c AD
DN-049	sherd scatter N of DN-048	16-18c AD
DN-050	Qaleh Mehdiabad	early Islamic, 19c AD
DN-051	Qaleh Ebrahimabad	16-18c, 19c AD
DN-052	Tepe Golsheh	Parthian
DN-053	Tepe Saadabad	11-14c AD
DN-054	Saadabad	11-14c AD
DN-055	scatter near Husseinabad	not an independent site
DN-056	mound near DN-021	early Islamic, 9-10c, 19c AD
DN-057	sherd scatter near Astaneh	early Islamic, 16-18c, 19c AD
DN-58	sherd scatter NW of Baba Hafez	late Sassanian-early Islamic, 11-14c AD
DN-059	sherd scatter between DN-058 and Baba Hafez	9-10c, 11-14c AD
DN-060	sherd scatter SE of Baba Hafez	early Islamic, 9-10c, 11-14c, 19c AD
DN-061	sherd scatter N of Baba Hafez	early Islamic, 9-10c, 19c AD
DN-062	Kuh-e Mernegar	11-14c, 16-18c, 19c AD
DN-063	sherd scatter NE of Baba Hafez	Sassanian-early Islamic, 9-10c, 19c AD
DN-064	sherd scatter SE of Baba Hafez	9-10c, 11-14c AD
DN-065	sherd scatter SE of Kuh-e Mernegar	11-14c, 19c AD
DN-066	Mansur Kuh	early Islamic, 11-14c, 16-18c, 19c AD
DN-067	sherd scatter SE of DN-065	Sassanian, 19c AD
DN-068	qaleh SE of Ahvanu	11-14c, 19c AD
DN-069	wall complex SE of Ahvanu	early Islamic, 11-14c AD
DN-070	walls on Kuh-e Ahvanu	Sassanian
DN-071	sherd scatter in river gorge (gorge of Dāmghānrud)	early Islamic, 19c AD
DN-072	mounds S of DN-015	Sassanian
DN-073	Tepe Guri	Sassanian
DN-074	mound S of Tepe Guri	Parthian &/or Sassanian
DN-075	Tepe Colmumeh, N mound	16-18c, 19c AD
DN-076	Tepe Colmumeh, NW quadrant	9-10c, 11-14c, 16-18c, 19c AD
DN-077	Tepe Colmumeh, S mound	late Sassanian-Early Islamic, 11-14c AD
DN-078	Tepe Colmumeh, NE quadrant	11-14c, 19c AD
DN-079	Tepe Colmumeh, SW quadrant	Sassanian-early Islamic, 9-10c, 19c AD
DN-080	Tepe Colmumeh, SE quadrant	Parthian (may be intrusive), 11-14c, 19-20c AD
DN-081	wall N of Tepe Colmumeh	Sassanian-early Islamic, 9-10c, 11-14c AD
DN-082	wall at spring N of Tepe Colmumeh	11-14c, 19c AD
DN-083	defensive wall near DN-082	11-14c, 19c AD
DN-084	Tepe Baq	Sassanian, 11-14c, 19c AD
DN-085	wall complex NW of Taq	11-14c, 16-18c AD
DN-086	standing walls SE of Vamerzan	late Sassanian-early Islamic, 11-14c AD, 19c AD
DN-087	wall SE of Imamzadeh Vamerzan	early Islamic, 19c AD
DN-088	wall complex N of Vamerzan	19c AD
DN-089	wall complex NE of Hajjiabad	early Islamic, 11-14c AD
DN-090	small mound S of Baq	Parthian
DN-091	standing walls SW of Baq	11-14c, 19c AD

List of Sites

Number	Name or Description	Period(s) of Pottery Represented on the Site Surface
DN-092	standing walls S - SW of Baq	11-14c, 19c AD
DN-093	standing walls SW of Baq	19-20c AD
DN-094	sherd scatter between DN-089 and DN-093	early Islamic, 11-14c, 19-20c AD
DN-095	sherd scatter SW of DN-091 - DN-094	Sassanian
DN-096	standing wall SE of Mayan	late Sassanian-early Islamic, 11-14c AD
DN-097	imamzadeh SW of Mayan	11-14c, 19-20c AD
DN-098	wall complex SW of Mayan	Sassanian-early Islamic, 16-18c, 19c AD
DN-099	wall complex S-SW of Mayan	11-14c, 19-20c AD
DN-101	Qaleh Mayan	16-18c, 19c AD
DN-102	wall complex E of Mayan	11-14c AD
DN-103	mound NE of Mayan	Hesār I, Parthian
DN-104	mound N-NE of Mayan	Hesār I
DN-105	mound S of Hajjiabad	Hesār I, Parthian
DN-106	sherd scatter SW of Caz	Hesār I
DN-107	wall complex near Labrud	early Islamic, 11-14c AD
DN-108	building in Labrud	early Islamic, 16-18c, 19c AD
DN-109	sherd scatter SE of Baba Hafez	11-14c, 19c AD
DN-110	sherd scatter SE of Baba Hafez	11-14c AD
DN-111	small mound SE of Zargabad	11-14c AD
DN-112	Qajar qaleh in Taq	late Sassanian-early Islamic, 11-14c, 16-18c, 19c AD
DN-113	small mound W of Abulbargh	19c AD
DN-114	wall W Gaz	19-20c AD
DN-115	sherd scatter near DN-113	Sassanian, 11-14c, 16-18c, 19c AD
DN-116	Tepe Nareshan	Parthian
DN-117	Tepe Nareshan	Parthian
DN-118	wall traces near DN-118	late Sassanian-early Islamic, 13-14c, 19c AD
DN-119	small mound NE of DN-116	Sassanian, 19c AD
DN-120	Tepe Nareshan	Parthian
DN-121	2 small mounds SE of Nareshan	Parthian, 11-14c AD
DN-122	sherd scatter E of Nareshan	16-18c, 19c AD
DN-123	band and mound W of Gaz	Hesār I, Sassanian-early Islamic
DN-124	sherd scatter W of Abulbargh	11-14c, 19c AD
DN-125	walls & jube SE of Nosratabad	19-20c AD
DN-126	sherd scatter along Dāmghānrud	Parthian-early Sassanian, 16-18c, 19-20c AD
DN-127	sherd scatter near Ab-e Bakhsan	Parthian-Sassanian, 16-18c, 19-20c AD
DN-128	sherd scatter near DN-033	Parthian, 18-19c AD
DN-129	sherd scatter near DN-035	Parthian-early Sassanian
DN-130	sherd scatter near DN-004	Sassanian-early Islamic
DN-131	sherd scatter near DN-004	Parthian-Sassanian, 11-14c, 19-20c AD
DN-132	sherd scatter between Mayan & Firuzabad	Hesār I (&III?)
DN-133	small mound SW of Firuzabad	Hesār I, Parthian
DN-134	Qajar citadel in Firuzabad	16-18c, 19c AD
DN-135	sherd scatter N-NW of Firuzabad	9-10c AD
DN-136	sherd scatter N of Firuzabad	11-14c, 19c AD
DN-137	building S of Tepe Hesār	Hesār I-III, Parthian, 19-20c AD
DN-138	qaleh NW of Tepe Hesār	Sassanian, 16-18c AD
DN-139	walls near DN-138	late Sassanian-early Islamic
DN-140	small mound NW of Tepe Hesār	Parthian
DN-141	building S of Tepe Hesār	Sassanian, early Islamic, 16-18c, 19-20c AD
DN-142	qaleh SW of Tepe Hesār	Hesār I-III, Parthian-Sassanian, 19-20c AD
DN-143	small mound SE of Dāmghān	9-10c AD
DN-144	sherd scatter SW of Dāmghān	19c AD
DN-145	small mound SW of DN-008	16-18c AD, 19c AD
DN-146	sherd scatter E of Dāmghān	Parthian-Sassanian, early Islamic, 9-10c, 19-20c AD
DN-147	walls E of Dāmghān	9-10c, 11-14c AD
DN-148	small mound near headworks	19c AD
DN-149	sherd scatter NW of 153	11-14c AD
DN-150	mound NW of headworks	Sassanian
DN-151	walls E of DN-150	Sassanian
DN-152	walla near DN-151	19c AD (may have Sassanian intrusion)
DN-153	mound NE of DN-008 (brick kiln)	Sassanian, kiln is 19-20c AD
DN-154	not used	
DN-155	Tepe Hesār	Hesār I-III
DN-156	Tepe Kharmenu; visible brick wall	no sherds visible on surface
DN-157	Tepe Mil	11-14c AD
DN-158	Tepe Versian	16-19c AD (?) (surveyed in snow)
DN-159	wall & mound near DN-158	16-19c AD (?) (surveyed in snow)
DN-160	mound near Qaleh Ebrahimabad	16-19c AD (?) (heavily disturbed by modern brick kilns nearby)
DN-161	Tepe Esmailabad	Sassanian-early Islamic, 19c AD
DN-162	Tepe Masumzadeh	early Islamic, 11-14c AD
DN-163	Tepe Faikhan	11-14c, 16-18c AD
DN-164	mound SW of Kodratabad-Sorkh Deh road	early Islamic, 11-14c AD (?) (surface material very sparse)
DN-165	Shahr-e Gomesh	11-14c, 16-19c AD (?) (surveyed in snow)
DN-166	Naranj Qaleh	11-14c, 16-18c, 19c AD

* DN-100 was not used to avoid confusion in numbering sherds with DN-001

XVI. KEY STRATIGRAPHIC AND RADIOCARBON ELEMENTS FOR THE 1976 HESĀR SEQUENCE

Robert H. Dyson Jr. and Barbara Lawn

Equivalent Schmidt Grave Group	Main Mound Building Stage	Main Mound	North Flat	South Hill	Treasure Hill	The Twins
III C	A	Highest preserved stratum P-2620 2150-1885 B.C.	Structure over Burned Building		CH86 Below top two building levels Tunc 20 1940-1705 B.C.	
III B	B/C	DG 20 ovens P2618 2640-2390 B.C.	Burned Building P2701 2420-2290 B.C.			
II B	D	Building 3a (Room 11) P2708 3360-2995 B.C. Room 7 P2710 3175-2920 B.C. Area 2 P2621 3380-3160 B.C. Kiln 3 P2707 3375-3150 B.C. Kitchen 1 P2711 3385-3165 B.C. Building 2,3 P2709 3380-3155 B.C.	Below Burned Building P2703 3030-2875 B.C. P2617 3355-2955 B.C. Burned CF58 Rooms 2 and 3 P2706 3000-2855 B.C. P2698 3040-2880 B.C. P2615 3165-2905 B.C. P2700 3170-2915 B.C. CF57 NW corner P2704 3160-2900 B.C. CF 57 SW corner wall niche P2699 3355-2945	DG61 Struc- ture P2715 3365-3010 B.C. Lapis stratum DG80 P2773 3370-3050 B.C.		Grey Pottery levels P2767 3335-2945 B.C.
I/IIA	E/F	Baulk 13 DF09 P2622 4345-3515 B.C. P2774 4590-4545 B.C.	(Later Painted Pottery) CF57 deep test lot 3 P2619 3685-3525 B.C. CF 57 SW corner lowest level P2623 4120-3875 B.C.	DF-below metal working phase P2763 3790-3635 B.C. P2765 3895-3765 B.C.		Latest Painted Pottery level P2764 3860-3650 B.C.

Note: The MASCA corrections are published in *Radiocarbon* 24 : 103-150 (1982). Dates given here are CRD-1 SD corrections.
For Hesār dates see: Barbara J. Hurst and Barbara Lawn 1984 «University of Pennsylvania Radiocarbon Dates XXII», *Radiocarbon* 26 (2 : 212-240).

XVII. HESĀR PRELIMINARY REPORT: OBJECTS BY MATERIALS (1976)

Mary Virginia Harris

Register Number	Provenience			Burial B	Obj. No.	Object Description	Dimensions (in cms.)			University Museum Photo Number
	Grid Ref	Level (I)	Area □				L.	W.	Th.	
BONE										
H76-45	DF 09	Surface	/80			Perforator	6.3	2.35	0.7	99049:30
H76-46	CG 90 (3)	P	/83			Tool, animal bone worked	15.5	2.3	1.0	99049:31
METAL – Copper/bronze										
H76-1	FF 95	Surface				Double spiral pin	16.0	6.0	0.6	99048:2
H76-2	CF 42	Surface				Double ended object.	0	0.2	0.2	99048:3
H76-3	DG 10	Surface				Chisel, flat head on round shank	6.8	0.49	0.49	99048:4
H76-7	FF 95	Surface				Ring, 3 bands joined (found with H76-1)	2.2	0.7	0.3	99048:10
H76-27	CF 48 2	Bl	/7			Bracelet, coils	63.0	0.5	0.5	99049:2-3
H76-44	CG 90 (8)	10	/77			Quadrilateral arrow point	4.6	0.65	0.65	99049:29
H76-47	DF 09 (8)	/2				Length of cu/br	6.9	0.6	0.5	99049:33
H76-51	DG 01 (5)	11	/85			Bracelet, child's 7 coils	2.6	0.3	0.3	99050:6A
H76-52	DG 01 (5)	11	B6 /91			Anklet, lapped penannular	9.1	8.3	1.3	99050:7A
H76-53	DG 01 (5)	11	B6 /90			Bracelet, penannular	7.55	6.1	0.75	99050:8A
METAL – Silver										
H76-123	DG 01 (5)	11	B6 /128			Bracelet, thin sheet	—	—	—	99051:35
CLAY										
H76-6	Surface					Bead, circle with holes	3.0	3.0	1.3	99048:9
H76-15	FF 74	Surface				Cloth impressed on clay	4.4	2.6	0.9	99048:18-19
H76-35	DG 80 (W)					Stamp seal, pierced apex	3.2	3.4	1.8	99049:6-19
H76-36	DG 80 (X)					Bead, biconical	2.1	2.1	1.4	99049:32
H76-39	DF 89 (3)	11				Stamp seal, pierced apex	1.9	1.9	1.4	99049:23-24
H76-40	CG 90 (5)	6	/46			Spindle whorl, biconical	3.2	3.2	1.7	99049:25
H76-42	CG 90 (5)	7	/50			Bead, spheroid	0.9	0.9	0.9	99049:26-27
H76-48	DF 88 (3)	1	/1			Bead, spheroid	2.6	2.6	1.0	99049:32
H76-68	DF 88 (2)	1	/5			Pendant, tear drop bead	2.2	1.5	1.5	99050:19
H76-80	CF 58 (3)	3	/38			Stool, terracotta (min.)	4.3	2.9	2.8	99036:20-23
H76-90	DG 01 (5)	15	/120			Spindle whorl, biconical	2.5	2.5	1.5	99050:29
H76-91	DF 88 (3)	1	/1			Counter?	—	—	—	99050:30-32
H76-92	DF 88 (3)	1	/2			Jar seal? Bulla?	5.3	2.45	1.5	99050:33-34 99051:11 (group)
H76-63	DF 88 (3)	1	/3			Counter ? cf H76-91	3.5	2.75	1.8	99050:35-36 99051:11 (group)
H76-94	DF 88 (3)	1	/4			Counter? Blank tablet?	5.4	2.75	1.7	99051:1-2; 11
H76-95	DF 88 (3)	1	/5			Counter? Blank tablet?	5.4	2.8	1.6	99051:3,4; 11
H76-96	DF 88 (3)	1	/6			Counter? Blank tablet?	5.7	4.65	2.3	99051:5-6; 11
H76-97	DF 88 (3)	1	/7			Muller?	2.7	2.9	2.9	99051:7-8; 11
H76-98	DF 88 (3)	1	/8			Jar sealing?	4.1	3.8	2.7	99051:10-11
H76-99	DF 88 (4)	5	/2			Mold, miniature	4.0	4.5	1.9	99050:27-28
H76-122	DF 89 (6)	N11	/6			Tag? String holes	5.8	4.3	3.0	99051:12-25
H76-125	DF 89 (6)	N11				Counter? Pyramidal conc	1.7	2.3	2.1	99036:3
H76-136	DF 88/89	1				Beads, 10 pierced circles	2.2	2.2	1.2	99038:11
H76-137	FF 94 (10)	/1				Ingot mold, circular	6.0	16.0	16.0	99035:7-9; 99034:30-31; 99052:36
H76-138	DF 88 (2)	5	/1			Mold, two runnels	21.5	13.5	6.0	Color: Roll 9:8-9 Color: Roll 9:19-20
CLAY FIGURINES										
H76-16	CF 17 (D.B)	7	/5			Animal, double bull's heads Pin finial?	4.0	3.3	2.0	99048:20-24
H76-30	Surface					Animal	3.2	1.8	1.6	99049:6-10
H76-34	DF 78	1				Animal	7.6	2.9	3.35	99049:12, 15
H76-37	DF 89 (3)	/3				Human? conc base	3.7	3.0	3.0	99049:21
H76-49	DF 88 (1)	11	/1			Animal	4.0	2.0	3.1	99049:34; 99050:0
H76-50	CF 58 (3)	3	/17			Human	2.5	2.5	2.5	99050:5
H76-56	CF 58 (3)	2	/28			Animal, humped bull?	3.7	1.6	2.5	99050:9-13
H76-69	DG 80 (1)	11	/1			Human	2.1	1.9	0.9	99052:2
H76-76	CF 58 (3)	3	/39			« Mother goddess », columnar body; burnished highly	6.2	3.6	0.7	99036:4-7
H76-87	CF 46	Surface				Animal, sheep?	5.0	2.5	3.7	99050:20-24
H76-100	DF 19	Surface	/113			Human, stub arms	2.1	0.9	0.9	99051:26-27
H76-117	DG 01	Surface				Human, head missing	5.5	4.1	2.8	99036:3
H76-124	DF 88 (3)	5	/3			Human, stub arms	3.5	2.5	1.7	99051:36
H76-126	DF 88 (3)	5	/4			Human, stub arms	2.2	2.2	1.9	99036:3

Register Number	Provenience			Burial B	Obj. /No.	Object Description	Dimensions (in cms.)			University Museum Photo Number
	Grid Ref	Area (0)	□				L.	W.	Th.	
POTTERY										
(Note: In pottery measurement length=height from base; rim diameter=width; and maximum diameter=thickness)										
H76-4 DF 89 (3) 3						Object, drill holder?	5.3	3.9	3.9	99048:5
H76-17 CG 10 Dump						Spindle whorl	3.8	3.8	1.5	99048:5
H76-18 CF 58 Surface						Counter, ball	2.2	2.2	2.2	99048:26
H76-28 CF 48 2 B1 /6						Container, bowl, grey	12.5	15.0	16.0	99041:10; 99052:3A
H76-32 CG 90 (5) 4 /34						Container, bottle jar, grey	24.0	5.7	13.8	99052:29A
H76-33 CG 90 (6) 1 /33						Container, painted bowl pointed base	19.0	19.0	19.5	99052:6A
H76-41 CF 58 (3) 2 B1 /12						Container, jar, grey	12.8	8.3	11.2	99052:10A
H76-55 CF 58 (3) 3 /27						Small container, trough spouted jar, grey	5.8	3.8	7.4	99036:8-9
H76-58 CF 58 (3) 3 /19						Small container, pedestal bowl, painted	6.9	5.9	5.9	99036:27
H76-59 CF 58 (3) 3 /20						Small container, bowl painted	5.0	4.1	6.0	99036:10
H76-60 CF 58 (3) 3 /25						Small container, pedestal Bowl, light mottled	7.8	7.0	7.0	99036:24
H76-61 CF 58 (3) 3 /26						Container, bowl, two small holes bored near rim, greyish-white	4.0	10.5	10.5	99036:11-12
H76-62 CF 58 (3) 3 /32						Small container, jar	5.5	2.7	4.1	99036:14
H76-63 CF 58 (3) 3 /24						Miniature bed, litter type	11.6	4.8	1.1	99050:16A-18A
H76-64 CF 58 (3) 3 /30						Small container, bowl, painted	5.4	4.6	6.9	-
H76-65 CF 58 (3) 3 /31						Small container, bowl, painted like H76-64	4.5	3.9	5.9	99036:19
H76-66 CF 58 (3) 3 /33						Small container, pedestal bowl, light tan-grey, slip and polished	7.6	6.5	6.6	99036:25
H76-67 CG 90 (6) 3 /100						Container, jar, incised	12.0	7.5	12.5	99052:8A
H76-70 DG 01 (5) 11 B6 /89						Container, long necked jar incised	41.0	6.25	19.5	99043:29A; 99052:1
H76-71 DG 01 (5) 11 B6 /88						Container, bowl, grey	15.0	11.6	13.3	99043:33; 99052:35
H76-72 DG 01 (5) 11 B6 /87						Container, bowl/vase, pointed base, grey	12.0	8.5	8.5	99052:33A
H76-73 DF 89 (3) 13						Container, bowl, pointed or dimple base, painted	13.5	11.5	11.5	99052:7
H76-74 DF 89 (1) 13						Small container, pedestal bowl, grey	8.5	14.0	9.0	99052:22A
H76-75 CF 58 (3) 2 B1 /11						Container, bottle jar, grey	20.5	4.2	15.0	99052:30A
H76-77 CF 58 (3) 3 /42						Small container, pedestal bowl, painted	8.4	7.4	7.5	99036:26
H76-78 CF 78 (3) 3 /36						Small container, pedestal bowl, grey-tan.	6.1	4.4	4.7	99036:15
H76-79 CF 58 (3) 2 /41						Miniature container, basin, tan	3.0	7.0	7.0	99036:29-31
H76-80 CF 58 (3) 3 /38						Miniature stool, four legs with saddle seat	4.3	2.9	2.8	99036:20-23
H76-81 CF 58 (3) 3 /34						Small container, pedestal bowl bell shape, burnished, fine, medium grey	9.3	8.6	8.6	99036:13
H76-82 CF 58 (3) 3 /43						Container, pedestal bowl, burnished, fine, grey	29.0	24.5	24.5	99052:13A
H76-83 CF 58 (3) 3 /44						Container, long necked bottle-jar, burnished, light grey	25.5	4.5	15.8	99052:20A
H76-84 CF 58 (3) 3 /45						Offering stand, burnished fine, brown	40.5	4.1	21.7	99052:15B
H76-85 CF 58 (3) 2 /32a						Container, bottle-jar, buff	11.5	4.8	13.5	99052:23A
H76-86 DG 01 (5) 11 /105						Container, bowl, buff	9.5	8.5	10.0	99052:9A
H76-88 CF 58 (3) 3a /47						Small container, pedestal bowl, grey-tan	9.0	6.5	7.0	99036:16; 99050:25A-26A
H76-89 CF 58 (3) 3a /52						Small container, bowl, painted	7.2	5.5	7.5	99036:28
H76-101 FF 94 /1						Container, squat jar, fire-blackened	7.5	7.6	12.2	99052:31A
H76-102 CF 58 (3) 3 /56						Small container, bowl	1.9	2.0	2.0	99051:28
H76-103 CF 58 (3) 3 /55						Miniature chalice	3.1	2.0	2.0	99051:28
H76-105 DF 88 (2) 11						Container, bowl with pointed base, painted	14.0	14.8	14.5	99052:20A
H76-106 DF 78 (2) 1						Container, bowl, red-on-buff	5.3	9.5	9.5	99052:34A
H76-107 DF 89 (2) 2a						Container, bowl, painted	5.0	11.4	11.4	99052:32A
H76-108 CF 58 (3) 3 /60						Miniature offering table	2.7	3.4	3.4	99051:28-30
H76-109 CF 58 (3) 2 /58						Container, brazier on pedestal	*18.4	14.3	18.5	
H76-110 CF 58 (3) 3 /61						Container, pedestal bowl, bell shaped, burnished, light grey	36.0	24.0	24.0	99052:17A
H76-111 CF 58 (3) 3 /49						Container, pedestal bowl chalice type, painted	12.0	9.0	12.3	99052:25A
H76-112 CF 58 (3) 3 /59						Container, bowl, burnished, fine, brown	8.0	12.8	12.8	99052:11A
H76-113 CF 58 (3) 2 /24a						Container, pedestal bowl		14.1	16.1	99052:19A
H76-114 CF 58 83) 2 /15						Container, pedestal bowl, bell shaped, grey	18.0	16.5	16.5	99052:27A
H76-115 CG 90 10 B7 /99						Container, bowl	11.5	12.0	13.0	99052:12A
H76-116 CF 58 (3) 3 /63						Small container, trough spouted bowl, buff	6.3	4.5	7.5	99036:17-18
H76-118 CF 58 (3) 3 /50						Plate, gritty orange-yellow	3.5	29.5	29.5	-
H76-119 CF 58 (3) 3 /53						Base of pedestal bowl, burnished fine, medium grey	5.0	11.8	1.8	99052:5A
H76-120 CF 58 (3) 3 /46						Base of offering stand	11.5	23.5	23.5	99052:28A
H76-127 CF 58 (3) 3 /65						Container, pedestal bowl, burnished, light grey	28.0	16.3	19.7	99052:18A
H76-128 CF 58 (3) 3 /66						Container, pedestal bowl, burnished, light grey	33.0	17.5	17.5	99052:14A
H76-129 CF 58 (3) 3 /54						Container, pedestal bowl, burnished, fine light brown	21.5	16.0	18.0	-
H76-135 DF 89 12						Container, bowl, fine, grey-tan	12.2	14.4	14.4	99052:21A
H76-139 CF 58 (3) /72						Small container, bowl, 2 holes near rim, lightly burnished, fine buff	4.2	10.5	10.5	99052:4A
H76-140 CF 58 (3) 3 /62						Container, bottle-jar, burnished, light grey	23.3	4.5	16.9	99052:24A
H76-141 CF 58 (3) 3 /73						Container, pedestal bowl, burnished, fine, brown	19.0	13.0	14.0	-
WOOD										
H76-123 DF 89						Bead, charred, inscribed	2.1	2.1	21.1	99048:6-7

* estimate due to poor condition.

Register Number	Grid Ref	Provenience		Burial B	Obj. /No.	Object Description	Dimensions (in cms.)			University Museum Photo Number
		Level ()	Area □				L.	W.	Th.	
STONE – Beads										
H76-38	CG 90 (6)	10	B4	/44		Necklace: 38+ beads including 271/2 crystal, carnelian, lapis, etc.	—	—	—	99049:22
H76-54	DG 01 (5)	11	B6/86			Necklace: 48 beads including 43 lapis, crystal, carnelian, etc.	—	—	—	
H76-121	FF 94	1	/1			Necklace: 24 beads including lapis, carnelian, (shell and 20 frit).	—	—	—	99051:33-34
H76-57	CF 58 (3)	3	/29			Pendant, tear drop, crystal in plaster	1.5	0.8	0.8	99050:14A-15A
GROUND STONE										
H76-23	Surface					Animal figurine, sheep	3.7	2.4	1.4	99048:30-33
H76-24	CG 90 (6)	1	/16			Whorl? biconical, hole diam. 0.9 cm	4.1	4.1	3.35	99048:36-37
H76-25	CF 90 (4)	5	/18			Small stone with worn depressions	2.8	2.8	1.5	99048:35
H76-26	CG 90 (6)	1	/24			Stone with encircling groove	7.6	5.0	3.2	99049:1
H76-29	CG 90 (7)	2	/32			Fossil ammonite cephalopod	8.5	7.5	2.5	99049:4-5
H76-104	DF 89 (4)	3	/1			Handstone, discoidal with pecked depression 0.5 cm deep	3.0	10.0	10.0	99038:10
H76-130	CF 58 (3)	2	/68			Grinding stone, saddle shaped	39.0	27.0	9.0	99038:8; 99046:9
H76-131	CG 90 (6)	1	/3			Handsyone with knobbed handles	38.0	19.5	16.0	99038:9
H76-132	CF 58 (3)	2	/71			Handsyone, trapezoidal	12.5	7.9	5.4	99038:8
H76-133	CF 58 (3)	2	/69			Handsyone, trapezoidal	11.6	7.3	3.8	99038:8
H76-134	CF 58 (3)	2	/70			Handsyone, rectangular	11.85	7.4	5.0	99038:8
CHIPPED STONE										
H76-8	FF 74	Surface				Spear point	4.4	1.6	0.6	99048:11
H76-9	CF 37	Surface				Blade, double edged	7.5	1.9	0.7	99048:12
H76-10	CF 37	/1				Arrowhead, laurel leaf	3.4	1.4	0.45	99048:13
H76-11	CF 37	3 /2				Arrowhead, laurel leaf	4.0	1.6	0.4	99048:14
H76-12	CF 37	3 /3				Arrowhead, laurel leaf	4.9	1.9	0.5	99048:15
H76-13	CF 46	Surface				Arrowhead, laurel leaf	3.4	1.55	0.4	99048:16
H76-14	CF 37	3 /4				Arrowhead, laurel leaf, quartz	4.6	1.7	0.3	99048:17
H76-19	CF 58	Surface				Blade, single edge	6.1	2.4	0.7	99048:27
H76-20	CF 58	Surface				Blade, double edge	6.1	1.7	0.6	99048:28
H76-21	No. Flat	Surface				Blade, double edge	3.65	1.9	0.5	99048:34
H76-22	CG 11	Surface				Blade, single edge	7.4	3.3	0.6	99048:29
H76-31	CG 90 (5)	8 /36				Blade with sickle sheen	4.3	2.15	0.6	99049:11
H76-43	CG 90 (6)	5 /53				Arrowhead, laurel leaf	4.7	1.6	0.55	99049:28

HESAR PRELIMINARY REPORTS: Selected Study Samples as Mentioned in text (1976)

Register Number	Grid Ref	Provenience		Burial B	Obj. /No.	Object Description	Dimensions (in cms.)			University Museum Photo Number
		Level 0	Area □				L.	W.	Th.	
BONE										
H76-N65	CG 90	(4) 5 /65				Awl, fragment	(6.75)	2.2	1.5	
H76-N91	CG 90	(4) 5 /92				Awl, fragment	7.3	2.5	1.6	
CLAY										
H76-N13	CG 90	(5) 4 /5				Jar seal, fragment	(4.6)	(3.6)	3.0	
H76-N16	CG 90	(5) 4 /8				Jar seal, fragment	(5.6)	(3.8)	2.5	
H76-N18	CG 90	(5) 4 /10				Animal figurine, fragment	(2.8)	2.25	2.2	
H76-N21	CG 90	(5) 4 /12				Animal figurine, fragment	(3.0)	2.5	2.4	
H76-N26	CG 90	(5) 4 /11				Ceramic fragment, conical, coarse	(5.5)	2.8	2.3	
H76-N27	CG 90	(4) 5 /20				Shaft hole axe mold	(11.6)	7.7	1.5	
H76-N28	CG 90	(4) 5 /19				Ingot? mold	(8.3)	5.3	3.7	
H76-N29	CG 90	(4) 4 /15				Animal figurine, fragment	(5.65)	3.2	2.9	
H76-N30	CG 90	(4) 5 /14				Animal figurine, fragment	(3.9)	2.15	2.0	
H76-N32	CG 90	(4) 9 /21				Spindle whorl, bicone	4.4	4.4	3.6	
H76-N95	a-c DF 89	(6) N11 /30				Pyramidal cones	2.3	2.3	1.7	
							2.0	2.0	1.9	
							2.1	1.85	1.7	
GROUND STONE										
H76-N1	DF 89	1				Grinding stone, saddle shaped, fragment, basalt	(11.25)	(10.0)	(4.5)	
H76-N2	DF 89	1				Handstone, discoidal, fragment, sandstone, wt. 251 gm.	7.5	8.5	3.0	
H76-N3	Surface					Disc, pierced plano-convex, fragment, hole d. 0.2 to 0.6 cms.	2.9	(2.9)	0.6	
H76-N6	ED 90	Surface				Alabaster fragment	3.1	(2.0)	1.1	
H76-N8	DF 89	10				Light hammerstone, fragment, quartz	6.9	5.0	4.2	
H76-N9	DF 89	10				Flat rubbing stone, fragment, wt. 100 gms., mudstone	9.0	6.9	0.9	
H76-N14	CG 90	Surface /6				Base of container, fragment, alabaster/calcite	(3.3)	—	7.5	
H76-N15	CG 90	(5) 4 /7				Container, bowl, fragment, alabaster/calcite	(3.2)	—	—	
H76-N24	Surface					Pierced stone fragment	(4.5)	(2.6)	(1.3)	
H76-N25	DF 89	3				Handstone, discoidal with pecked depressions (est. 3 cm in diam. and less than 1 cm. deep, fragment, sandstone)	8.2	(5.3)	(3.0)	
H76-N47	CF 58	(1) 14 /8				Disc, fragment, alabaster	(13.3)	(5.9)	(3.0)	
H76-N48	CG 90	5 /43				Grinding/pounding stone fragment, basalt	(9.2)	(6.1)	(4.5)	
H76-N51	CF 58	(1) /9				Stemmed alabaster plate, fragment, stem diam. 5.5 cm.	(5.0)	(10.5)	(2.0)	
H76-N60	CG 90	6 /48				Stone with encircling groove, groove 1.2 cm. wide, 0.1 cm. deep, wt. 32 gm., sandstone?	3.2	2.5	2.2	
H76-N90	DF 09	/93				Grindstone, saddleshaped, fragment	(11.8)	(8.3)	(4.0)	
H76-N99	DF 89	(6) N11 /5				Disc, pierced octagonal, fragment	2.15	2.15	0.25	
H76-N100	DF 89	(6) N11 /4				Rectangle, small polished, talcose siltstone	5.2	1.0	0.5	
H76-N108	DF 09	/111				Handstone, discoidal, fragment, carbonate sandstone	(7.0)	(5.7)	(2.5)	
H76-N10	DG 01	/5 /124				Pierced rectangular fragment, stone unknown, hole diam. 1.0 cm	3.2	(2.9)	(2.0)	
H76-N112	CF 58	(3) 2 /35				Pebble rubber, wt. 114 gm., limestone	5.2	4.7	3.5	
H76-N138	CG 90	6 /127				Stone with double ground depression 1.8 and 1.5 cm. deep, fragment, limestone	7.0	6.1	4.3	
H76-N144	FF 74	Surface				Handstone, discoidal with pecked depressions 1.0 cm. deep and 3.0 cm. in diam., est. original wt. 525-550 gm., fragment, limestone	(8.5)	—	4.0	
CHIPPED STONE										
H76-N31a	CG90	(6) 1				Chipped stone blade	(4.5)	1.8	0.5	
H76-N63a	CG90	(6) 10 /56				Chipped stone blade	(5.4)	2.2	0.5	
H76-N63b	CG90	(6) 10 /57				Chipped stone blade	(6.6)	2.2	0.5	
H76-N64a	CG90	(6) 10 /60				Chipped stone blade	(5.0)	2.2	0.5	
H76-N64b	CG90	(6) 10 /61				Chipped stone blade	(4.2)	1.7	0.6	
H76-N82	CG90	(6) 10 /74				Chipped stone blade	(4.8)	1.8	0.6	
H76-N83a	CG90	(6) 10 /75				Chipped stone blade	(4.7)	2.1	0.5	
H76-N116	DF09	(9) /116				Chipped stone blade	(3.2)	1.7	0.4	
H198	33-15-368-	DF18				Chipped stone blade	7.1	2.0	0.5	
H331	33-15-71	CG95				Chipped stone sickle blade	(6.4)	1.7	0.7	
H592	33-15-369	EG06				Chipped stone blade	(6.4)	2.1	0.6	
H835	33-15-73	DH21				Chipped stone blade	(6.7)	2.2	0.5	
H840	33-15-72	DG 36				Chipped stone blade	(5.8)	1.9	0.6	
H847	33-15-370	DH73				Chipped stone blade	8.5	1.3	0.5	
H967	33-15-371	DH73				Chipped stone blade	(9.7)	2.2	0.6	
H1091	33-15-372	EH13				Chipped stone sickle blade	(7.9)	1.6	0.6	
H1242	33-15-74	DG69 grave 14				Chipped stone blade	(6.8)	1.5	0.6	
H1695	33-15-608	DF78				Chipped stone blade	9.8	1.8	0.7	
H2250	33-21-606	DF78				Chipped stone blade core	7.6	2.5		
H3380	33-21-172	EH13				Chipped stone blade core	10.8			

* Note: Incomplete measurements in parenthesis ().

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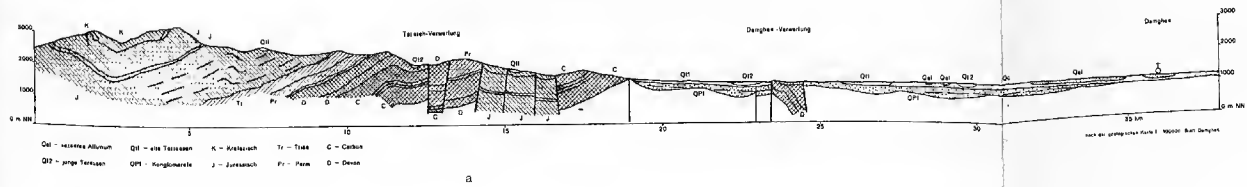
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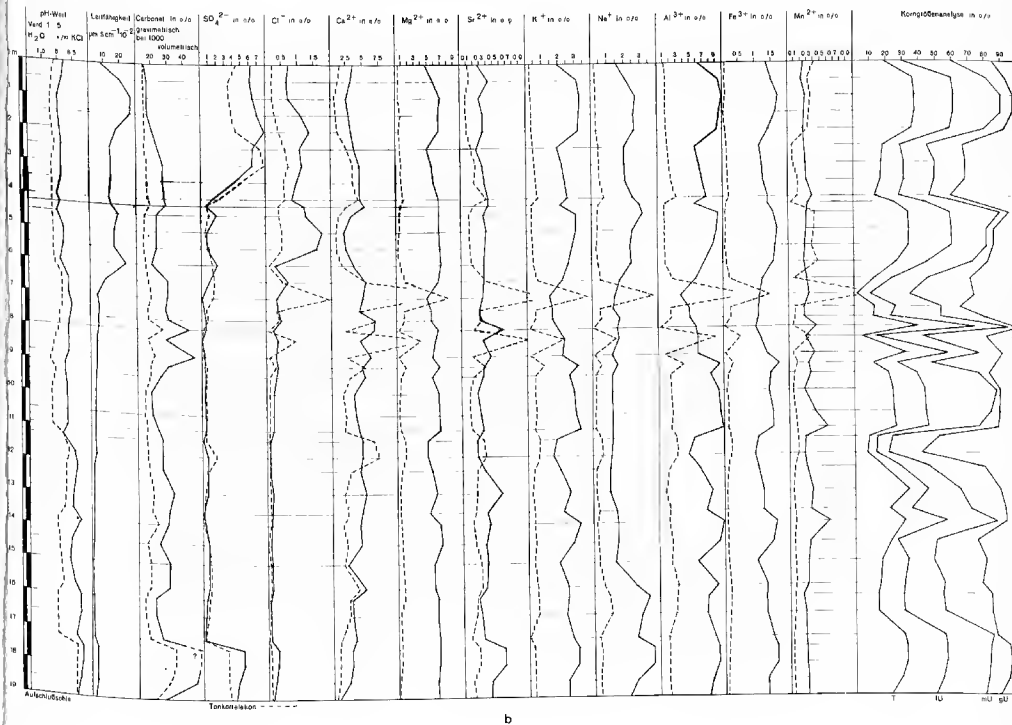
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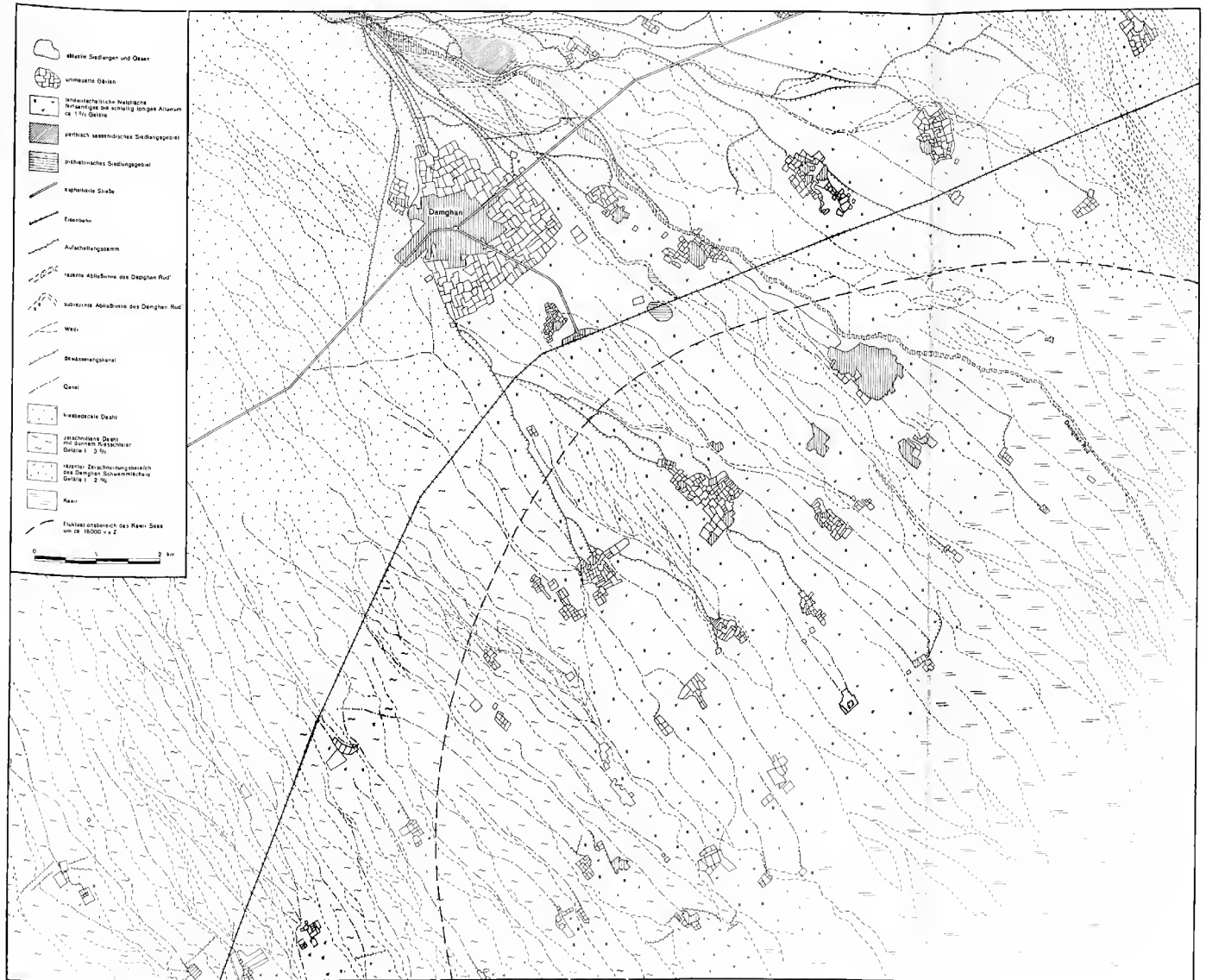
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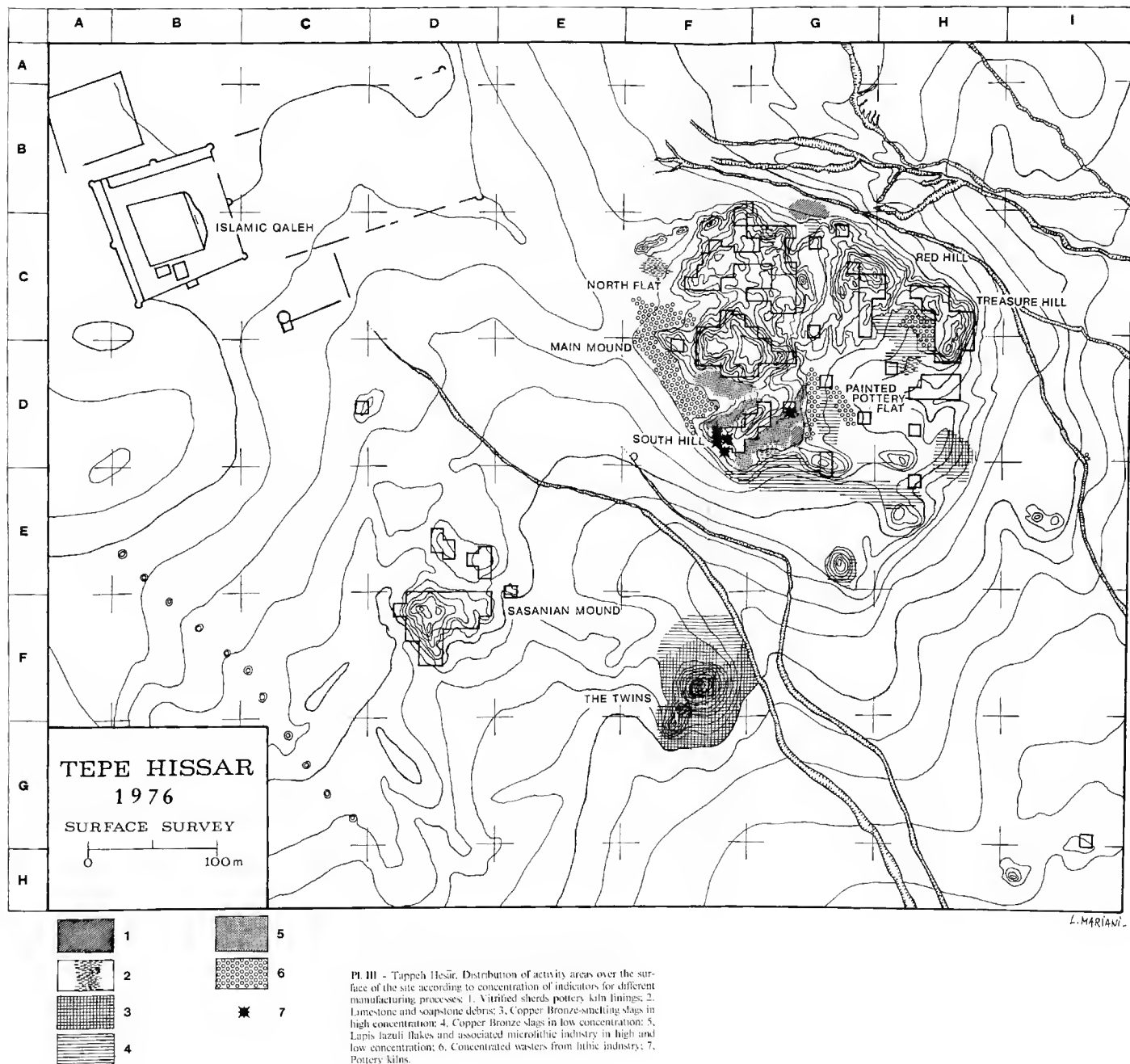


Qanat-Profil unterhalb Tepe Hissar, Damghan



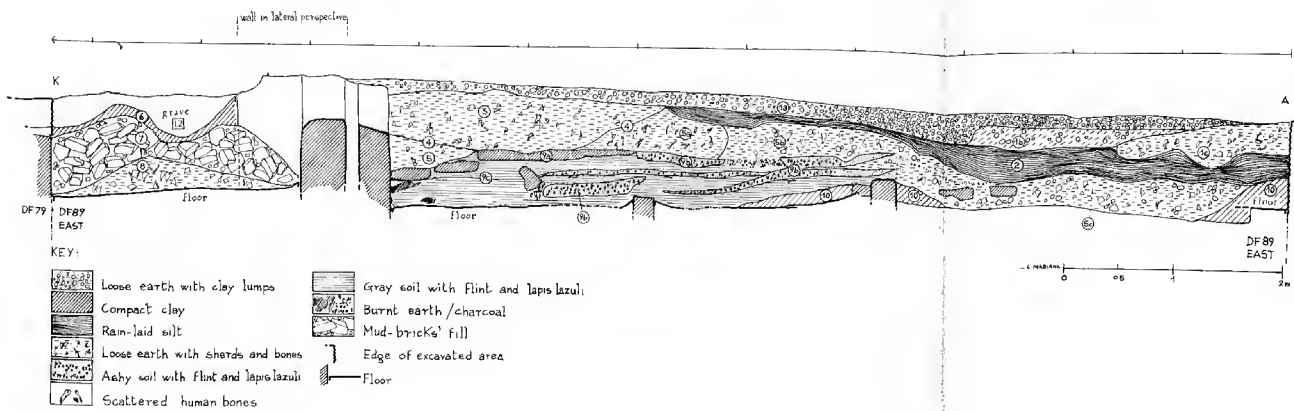
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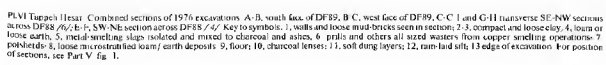
Pl. III - Tepe Hissar. Distribution of activity areas over the surface of the site according to concentration of indicators for different manufacturing processes: 1. Vitrified sherds pottery kiln linings; 2. Limestone and soapstone debris; 3. Copper Bronze-smelting slags in high concentration; 4. Copper Bronze slags in low concentration; 5. Lapis lazuli flakes and associated microlithic industry in high and low concentration; 6. Concentrated wasters from lithic industry; 7. Pottery kilns.

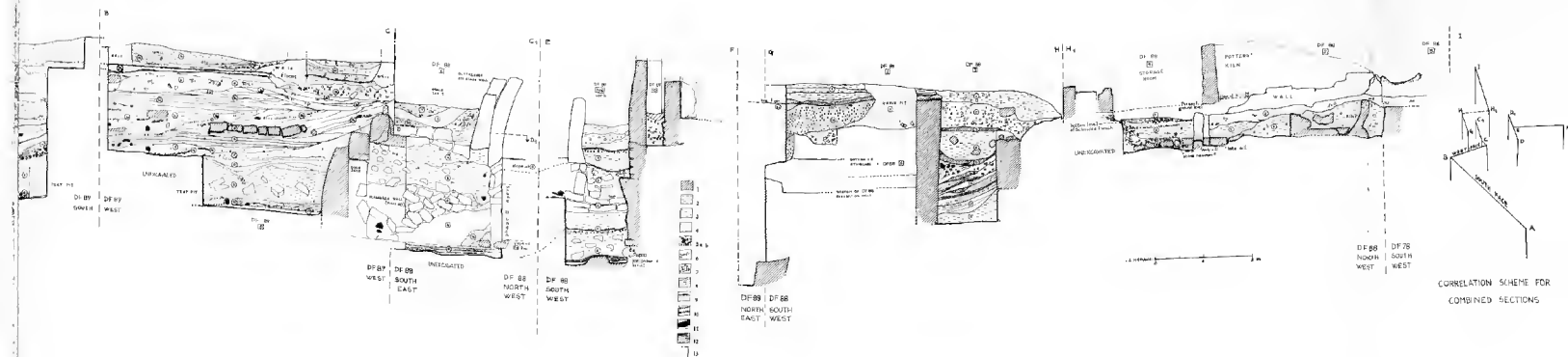
TEPE HISSA, 1976 DG 80/DF 89 LAPIS LAZULI WORKSHOP : NORTH-SOUTH SECTION



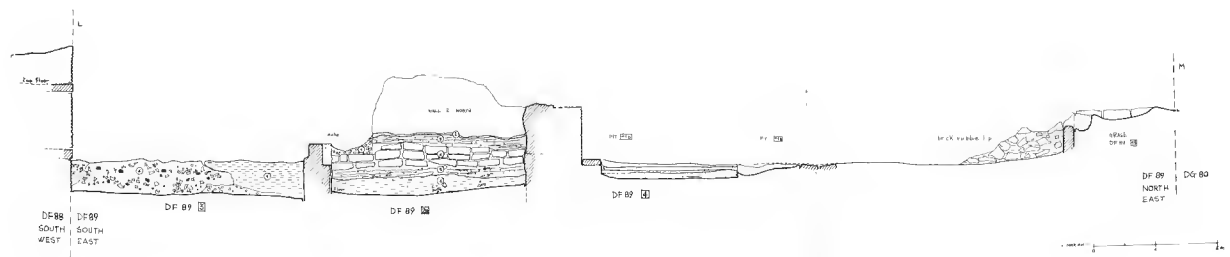


Pl. V: Tappah Hesar. General plan and periodization of exposed structures as excavated squares in South Hill. Area exposed in 1976 have been correlated and partly superimposed to the plan by E. Schmidt.





Pl. VII



Pl. VII - Tappeh Hesar. E-W section across the northern side of sq. DF 89 with phase 6 in deposits pits of area DF 89 / III/